

AD-A174 116

MEASUREMENT OF CIVIL ENGINEERING CUSTOMER SATISFACTION

1/2

IN TACTICAL AIR CO (U) AIR FORCE INST OF TECH

WRIGHT-PATTERSON AFB OH SCHOOL OF SYST

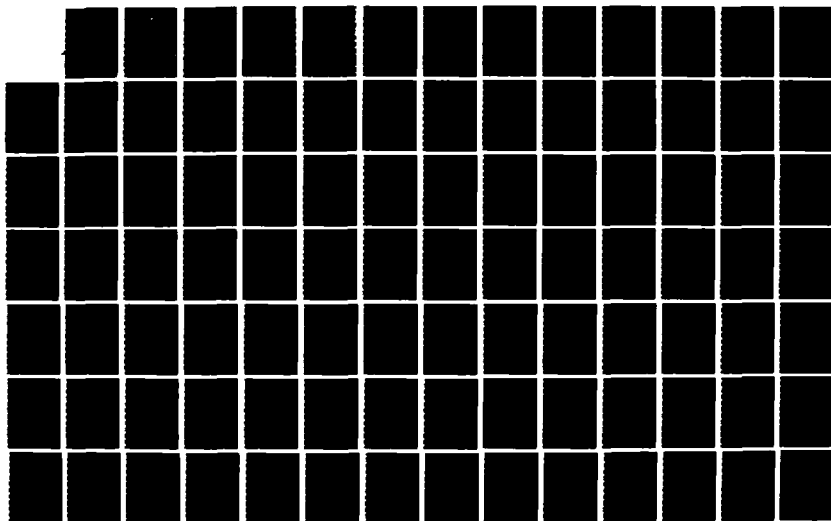
K R SINGEL

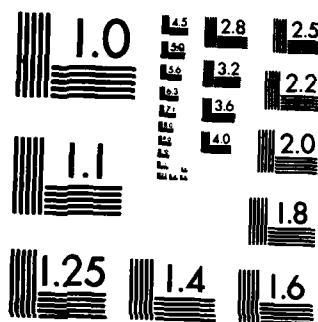
UNCLASSIFIED

SEP 86 AFIT/GEN/DEM/86S-23

F/G 5/1

NL





XEROCOPY RESOLUTION TEST CHART  
 NATIONAL BUREAU OF STANDARDS-1963-A

AD-A174 116



MEASUREMENT OF CIVIL ENGINEERING  
CUSTOMER SATISFACTION IN  
TACTICAL AIR COMMAND:  
A PROTOTYPE EVALUATION PROGRAM

THESIS

Kenneth R. Singel  
Captain, USAF

AFIT/GEM/DEM/86S-23

DTIC  
ELECTE

NOV 20 1986

E

DEPARTMENT OF THE AIR FORCE  
AIR UNIVERSITY

**AIR FORCE INSTITUTE OF TECHNOLOGY**

Wright-Patterson Air Force Base, Ohio

This document has been approved  
for public release and using the  
information is unlimited.

86 11 19 111

DTIC FILE COPY

2

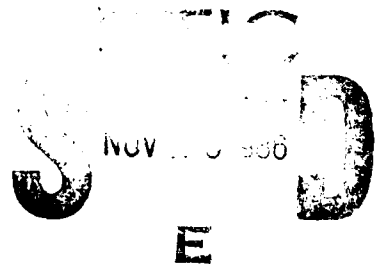
AFIT/GEM/DEM/86S-23

MEASUREMENT OF CIVIL ENGINEERING  
CUSTOMER SATISFACTION IN  
TACTICAL AIR COMMAND:  
A PROTOTYPE EVALUATION PROGRAM

THESIS

Kenneth R. Singel  
Captain, USAF

AFIT/GEM/DEM/86S-23



Approved for public release; distribution unlimited

The contents of the document are technically accurate, and no sensitive items, detrimental ideas, or deleterious information is contained therein. Furthermore, the views expressed in the document are those of the author and do not necessarily reflect the views of the School of Systems and Logistics, the Air University, the United States Air Force, or the Department of Defense.

Accession For	
NTIS GRA&I	<input checked="checked" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By _____	
Distribution/	
Availability Codes	
Dist	Avail and/or Special
A-1	



AFIT/GEM/DEM/86S-23

MEASUREMENT OF CIVIL ENGINEERING CUSTOMER SATISFACTION  
IN TACTICAL AIR COMMAND:  
A PROTOTYPE EVALUATION PROGRAM

THESIS

Presented to the Faculty of the School of Systems and Logistics  
of the Air Force Institute of Technology  
Air University  
In Partial Fulfillment of the  
Requirements for the Degree of  
Master of Science in Engineering Management

Kenneth R. Singel, B.S.C.E.

Captain, USAF

September 1986

Approved for public release; distribution unlimited

## ACKNOWLEDGEMENTS

Thanks to Captain Gus Elliott and Dr. Dick Fenno for their guidance and support in the successful completion of this thesis. Gratitude is expressed to Captain Al Miller HQ TAC for his help and assistance. Special thanks is extended to a classmate, Captain John Borland, whose help with the statistical work assured that this thesis would be completed.

Finally, special appreciation and thanks is extended to my future wife, Laurie, for her help, support and unwavering faith in me, and for enduring the fifteen month separation without complaint.

## Table of Contents

	Page
Acknowledgement . . . . .	ii
List of Tables . . . . .	v
Abstract . . . . .	vi
I. Introduction . . . . .	1
Overview . . . . .	1
Statement of the Problem . . . . .	3
Objective of the Research . . . . .	4
Research Question . . . . .	4
Scope and Limitations of Study . . . . .	5
Definitions and Acronyms . . . . .	6
II. Literature Review . . . . .	9
Introduction . . . . .	9
Customer Satisfaction and Service . . . . .	9
The Nonprofit Organization . . . . .	19
Customer Service within the Department of Defense . . . . .	22
III. Methodology . . . . .	32
Overview . . . . .	32
The Survey . . . . .	32
Sample Population . . . . .	35
Data Collection Plan . . . . .	38
Statistical Tests . . . . .	39
IV. Findings and Results . . . . .	43
Introduction . . . . .	43
Response Characteristics . . . . .	43
Results . . . . .	45
V. Analysis and Discussion . . . . .	65
Introduction . . . . .	65
Research Question #1 . . . . .	65
Research Question #2 . . . . .	70
Additional Comments . . . . .	73
Summary . . . . .	73

VI. Conclusions and Recommendations . . . . .	75
Introduction . . . . .	75
Significance of the Results . . . . .	75
Uses and Implication of Results . . . . .	76
Recommendations for Further Research . . . . .	77
Appendix A: Respondent Comments . . . . .	78
Appendix B: Base Selection . . . . .	100
Appendix C: Survey Instrument . . . . .	102
Bibliography . . . . .	109
Vita . . . . .	112

# List of Tables

Table	Page
1. Response by Base . . . . .	44
2. Response by Rank . . . . .	44
3. Overall Response to Criteria Importance . . . .	46
4. Senior Officer Response to Criteria Importance . . . . .	49
5. Building Manager's Response to Criteria Importance . . . . .	51
6. Top Five Criterion According to Importance . .	53
7. Ranking of Customer Service Characteristics . .	54
8. Customer Satisfaction Correlation . . . . .	55
9. Criteria Found Not to Be Significant . . . . .	57
10. Criteria Found to Be Significant . . . . .	58
11. Customer Service Representative Attitude . . .	58
11.2 Professionalism of Civil Engineering Workers .	59
11.3 Cleanup Upon Work Completion . . . . .	59
11.4 Explanation of Work Upon Completion . . . . .	60
11.5 Keep Customer's Work Area Free of Clutter . . .	60
11.6 Civil Engineering Workers Appearance . . . . .	61
11.7 Information on CE Unit and Its Procedures . . .	61
12. Top Ten Criteria Impacting Customer Service and Satisfaction . . . . .	63
13. Single Most Important Criteria . . . . .	64
14. Ranking and Mean Level of Important Criteria .	69
15. Criteria Related to Customer Satisfaction . . .	69

Abstract

→ This thesis examines the effectiveness of Civil Engineering in Tactical Air Command (TAC) from the customer's point of view. The objective was to identify the criteria that had a significant impact on customer service and satisfaction. The purpose was to develop methods to evaluate and compare those criteria for inclusion into the TAC Civil Engineering PEERS competition.

A stratified survey was conducted of building managers and senior officers on eight TAC bases to identify customer needs and desires. The two groups were chosen to determine if significant variance existed for the criteria between senior leadership and the everyday customer. Statistical procedures were used to determine the relative importance of the resulting criteria and the impact on customer satisfaction. Several possible methods for evaluating the most important criteria are suggested.

↖

MEASUREMENT OF CIVIL ENGINEERING CUSTOMER SATISFACTION  
IN TACTICAL AIR COMMAND:  
A PROTOTYPE EVALUATION PROGRAM

CHAPTER I

INTRODUCTION

Overview

The primary mission of Air Force civil engineering has been to develop its war fighting capability and its capacity to sustain those operations. In addition to this primary mission, the engineering organization is primarily concerned with the operation, maintenance and repair of Air Force real property in peacetime environments. The Air Force civil engineering goal

is to provide an operational installation capable of supporting the mission, including the development and implementation of programs designed to improve the liveability of the base community (23:9)

The Air Force civil engineering squadron is a nonprofit organization whose goals are to provide a service to the base community. A nonprofit organization is defined as "an organization whose goal is something other than earning a profit for its owners. Usually its goal is to provide a service" (2:35). Since service is the ultimate goal of the organization, management decisions "are intended to result in providing the best possible service with the available

resources" (2:35). The effectiveness of the organization in providing that service is measured "primarily by how much service the organization provides and by how well these services are rendered"(2:36). This measurement of success in the Air Force civil engineering organization is defined by Air Force Regulation 85-1:

Positive results in terms of mission and people supporting programs are the best means of measure of success (23:9)

The question then becomes how these positive results should be measured. In commercial operations, the success of the organization is measured by a single criterion, profit. The amount of profit an organization earns is a measure of the amount of success of that organization, and that measure of success can also be easily quantified. In the nonprofit organization, this single measurement criterion is missing. This lack of the profit motive forces the nonprofit organization to evaluate the relative importance of its various objectives and determine ways of quantifying the results. Management of the organization "will view a proposal in terms of the relative importance that they personally attach to the several objectives of the organization" (2:42). The measure of the effectiveness of the Air Force civil engineering organizations has always been defined in terms of what the Air Force engineers considered a true measure of its effectiveness.

In Tactical Air Command (TAC), a new concept is emerging that views the effectiveness of an organization by how well that organization is meeting the needs of its customers. In this context, the civil engineering units of TAC needed to define who their customers are. AFR 85-1 provided some guidance to this question:

No other organization directly affects the living environment of every person on the base as does the BCE organization (23:9)

The civil engineering organization must not only define who the customer is but also must determine what customer needs are and how to meet those needs. Furthermore, the organization needs to determine what factors affect the customer's satisfaction with the organization and how to measure those factors.

#### Statement of the Problem

The civil engineering organization has traditionally been evaluated on how well it has used its resources in the accomplishment of its mission. The unit of measurement has been those factors that can easily be measured and quantified to provide a method of measuring the organization's effectiveness and efficiency. Subjective measures such as customer satisfaction were not used to determine unit effectiveness since such criteria were difficult to measure. As a consequence, little research has been done to determine if the civil engineering organization is effectively meeting the needs of its customers.

In 1984, Tactical Air Command established the civil engineering PEERS competition to evaluate the effectiveness of TAC's civil engineering units and to promote competition as a method of improving productivity. As part of a thesis effort, TAC requested that research be conducted to determine if the current PEERS indicators were the correct measures of customer service in TAC engineering units and, if not, what the correct measures of customer service were and how they could be quantified for inclusion into the PEERS competition.

#### Objective of the Research

The objective of this study was to determine those factors affecting the civil engineering customer's satisfaction within Tactical Air Command (TAC) and to design a method to evaluate those factors with particular attention to quantifying those characteristics for use within the PEERS program.

#### Research Question

The civil engineering organization provides several services to the base. These services include management of real property, utility service, engineering and construction, fire protection, family housing management, management of custodial services, as well as planning and programming of facility requirements (14:4). This study concentrated on customer satisfaction with the service

provided by the operations branch of TAC civil engineering. The two specific questions that were answered in order to meet the research objective are:

1. What specific criteria considered by customers to be important should be used in an evaluation program for Civil Engineering customer satisfaction for inclusion into the Civil Engineering PEERS competition of Tactical Air Command?

2. What is the best way to quantify these evaluation criteria?

#### Scope and Limitations of Study

The scope of this study is limited to:

1. Civil engineering units within Tactical Air Command located within the continental U.S. This author recognizes that Howard AFB, although part of Tactical Air Command, has problems and procedures that are unique to that base due to the location of the base outside the boundaries of the United States. For this reason, the base was excluded from consideration in the study.

2. The study was limited to only military building managers and senior officers. The study excluded civilian building managers and senior supervisors due to the time constraints of the study. The author recognizes that the civilian population of a base is an integral part of the customer population of the engineering unit. It is suggested that future studies should examine the civilian

customer base to determine if there is any significant deviation from the military response recorded in this study.

3. The study included tenant units on the selected bases since they are also part of the civil engineering units' customer base.

4. The study attempted both to define the important criteria and to develop a method of measuring those criteria. The study's purpose was to define the criteria from a customer's point of view by examining only a narrow segment of the customer base within a single major command.

#### Definitions and Acronyms

1. BCE -- The Base Civil Engineer. The officer in command of the base engineering unit.

2. CE -- Base Civil Engineering.

3. CONUS -- Continental United States

4. CSU -- The customer service unit of the base civil engineering organization. The single point of contact between the Base Civil Engineer and the customer.

5. Customer -- The person, unit or organization that is the beneficiary or recipient of a product or service.

6. Customer Service -- The activity and interaction of a organization with its customers in order to satisfy a customer's needs and expectations.

7. DE -- Office symbol designating the Base Civil Engineer.

8. Effectiveness -- Accomplishing the desired result or producing a desired capability at the right time in the right quantity (7).

9. Efficiency -- Accomplishing a desired result with the minimum of resources (7).

10. HQTAC/DEMG -- Office responsible for TAC civil engineering PEERs program

11. Job Order -- Work submitted to civil engineering of a minor nature, not requiring any detailed planning and usually involving a single shop (23:55).

12. O&M -- The operations branch of the base civil engineering organization. This branch is the portion of the engineering unit charged with the maintenance and repair of Air Force real property.

13. PEERs Competition -- Tactical Air Command program that compares the performance of similar units against a standard. Units are ranked ordered on the basis of performance.

14. Productivity -- The measure of how well an organization is accomplishing its mission with the amount of resources available. Productivity is the combination of effectiveness and efficiency.

15. Satisfaction -- "the result of some comparison process in which expectations are compared with that which is actually received, can differ from the actual evaluation or the perception of service quality" (8:13)

16. Standard -- A benchmark established by authority for use as a rule or basis of comparison in measuring quantity, quality, or value (24:583). In the context of this study the level of minimum acceptable performance of an organization.

17. TAC -- Tactical Air Command

18. WIMS -- Work Information Management System. New computer management information system for Base Civil Engineering.

19. Work Order -- Work usually complex in scope, requiring detailed planning that usually involves more than one shop (23:40).

## CHAPTER II

### LITERATURE REVIEW

#### Introduction

This chapter will review the current literature on the subject of customer service and satisfaction. It describes the current thought on the commercial application of customer service and describes ways commercial industry is improving its customer service. The chapter will further describe the public sector customer service, how it is similar to the commercial sector and how it differs. The chapter concludes with a discussion of the various initiatives that are currently being tested in the Department of Defense and in the Air Force's Tactical Air Command in particular.

#### Customer Satisfaction and Service

The literature on customer satisfaction and service from a customer's perspective in the commercial sector is extremely limited and practically non-existent in relation to the public sector. Tom Peters in A Passion For Excellence states that there is sufficient information from a marketing standpoint but little from the focus of the customer (18:112). The literature on commercial customer service appears to be directed at the marketing aspect of a product or service, with the primary objective being the increase of company profits. This profit motive does not

exist in the public arena. Nevertheless, many of the principles related to the private sector can be applied to the public sector.

### The Customer

In order to define customer service it is first necessary to define what a customer is. Warren Blanding defines a customer as "the end user of our service or product but not necessarily the actual purchaser" (5:15). For the purpose of this study, this definition will be modified slightly to read "a customer is any person affected by our product or service, not necessarily, just the requestor." This definition implies that any impact of the service being rendered affects more than just the requestor. Once an organization defines who their customers are, then it needs to determine what affects that customer's satisfaction or dissatisfaction with the service the organization is providing.

### Customer Satisfaction

Blanding's definition of the customer continues by defining the customer in terms of perceptions and expectations. Other authors on the subject feel that perceptions and expectations are the factors that affect a customer's satisfaction with a product or service, not characteristics of the customer. John A. Czepiel et al,

writing in their article "Service Encounters: An Overview" describe satisfaction as:

the result of some comparison process in which expectations are compared with that which is actually received, can differ from the actual evaluation or the perceptions of service quality (8:13)

Czepiel et al further contend that the customer's satisfaction with a service is related to three factors: the customer's perceptions, the provider's characteristics, and the production realities (this can be translated into resource availability when related to the public sector) (8:15). Another author, David H. Maister, expresses the relationship between satisfaction, perceptions, and expectations in a different way:

"The First law of Service," is expressed by the formula: Satisfaction equals perception minus expectation. If you expect a certain level of service and perceive the service received to be higher, you will be a satisfied customer. If you perceive the same level as before but expect a higher level you will be disappointed and therefore a dissatisfied customer (8:114).

Customer perception of the service, not necessarily the actual service, coupled with the level of expectation that customer has, is directly related to the customer's satisfaction. Maister also implies that once a customer's expectations are not met, it becomes difficult to reverse the negative perception of the service and the organization. There are several other factors related to perceptions and expectations. These include factors such as quality of the service, communication between the provider of the service and the customer, and how the contact between the customer

and the representative of the provider is perceived by the customer. Each of these factors requires some mention.

Additional Factors Affecting Customer Satisfaction  
Communication

The first factor is communication between the customer and organization providing the service. Communication, in this context, means being attuned to the customer's needs. Communication involves actively seeking criticism from the customer as a method of determining whether the organization is really meeting customer needs and desires. General Ellis, Director of Engineering and Services at the Air Staff, speaking before the 1986 class of Graduate Engineering Management Students stated that, Air Force Civil Engineering must learn how to "let the customer complain" (10). Thomas J. Peters in The Search For Excellence states that successful companies are better listeners and much of their innovation is in response to the information and desires of their customers (19:193-199). Peters further quotes a study by economist Christopher Freeman in which Freeman analyzed thirty-nine innovations in the chemical industry and thirty-three in scientific instruments. The study concluded:

Successful firms pay more attention to the market than do failures. Successful innovators innovate in response to market needs, involve potential users in the development of the innovation, and understand user needs better (19:197)

The Business Week article "Making Service a Potent Marketing Tool" explores the fact that business is seeking new ways to solicit information from their customers. The article states that in response to a White House Office of Consumer Affairs study and with the wide use of minicomputers:

Companies are now actively soliciting complaints from customers. And growing numbers of businesses are beginning to perceive buyer's views as integral to design, manufacture and sale of products and services (6:165).

The central theme in all the literature is that the customer can be an invaluable source of information for the organization. The active soliciting of complaints and information from the customer can help an organization improve its service and in the end increase the customer's satisfaction with that service.

### Quality

The next factor is quality. Quality is a term that can be defined in many ways, but however it is described, it is a perception in the mind of the receipt of the product or service. Quality has been described as workmanship, reliability, ease of use, the requirement for maintenance and repair or, when providing a service, as promptness, courtesy, mistake free delivery of the service and assistance in solving the problem (17:161-162).

William B. Miller in America's Management Challenge, Capitalizing on Change uses the example of the American

automotive industry to illustrate the impact of quality perception. The automotive industry's quality problems are foremost in the minds of the consumer. Ford Motor Company advertized the Ford Lynx and Escort as the cars of the eighties, but by mid 1981 the cars had been recalled eight time for repair of manufacturing and design defects. The Ford Pinto is known for its fuel tank problems, the Chevrolet Vega for rust and engine problems, and the Chrysler Aspen/Volare for its high rate of recall (17:164-165). In the customer's mind, the quality of American cars is not the same as the quality of the Japanese models. Miller further quotes a survey in which

ninety percent of owners of such foreign cars as Honda said that they would buy another one:comparable figures for the Escort/Lynx and X-cars was 70%. A survey of U. S. automotive experts and engineers revealed that these people thought that Japanese cars had higher quality (17:165).

The point here is not the difference in quality but the PERCEIVED difference in the quality that has been translated into customer satisfaction with the product and, in the case of the automotive industry, repeat customers. Thomas J. Peters states that the finest run companies such as IBM and McDonald's are obsessed with quality and are constantly striving to improve their products and services (19:171-182).

#### The Customer Contact

The final factor to be discussed is the customer contact. The customer contact occurs for several different

reasons. For example, the customer is seeking a service or good, or the customer has some problem that must be resolved by the organization. The contact could be initiated by the organization in order to acquire information on customer needs or desires. Whatever the reason for the encounter, if the quality of this contact is below the expectations of the customer, the customer will have a negative perception of the organization.

The impression received from the contact is the perception that usually remains with the customer and affects the customer's expectations of the service. Czepiel et al, as mentioned earlier in this chapter, suggests that the satisfaction a customer has with an organization is related to three factors: the client's perception of the service, the provider's characteristics, and the resources available (8:6-11). An organization has the most control over its own characteristics. IBM has the reputation of having an obsession with customer support and service. The perception of IBM's customers is that if there is a problem, IBM will "pull the plug out" in their effort to solve the customer's problem no matter the cost (18:72-76). IBM's obsession with serving the customer and the way it treats customer problems with a face to face encounter and genuine concern for the customer is readily translated into marketshare and profit, which has kept IBM as the leader in the computer industry for the last half century.

The point of the customer contact, as the literature emphasizes, is the way it can affect the customer's perception and consequently satisfaction with the product or service. The customer contact and how it is handled and the benefits from it is the foundation upon which the principles of customer service are based.

### Customer Service

Customer service has traditionally been associated with the complaints department of an organization. However, customer service in recent years has taken on a much broader meaning, encompassing not only the complaints department but almost every aspect of an organization's interaction with its customers. As a consequence, a broader definition of customer service is now necessary.

The authors reviewed for this study have a variety of definitions. Blanding defines customer service in terms of what the function does for the organization, such as filling orders, or working with customers and handling complaints (5:1-13). Paul S. Bender in Design and Operation of Customer Service Systems defines customer service as "the set of activities performed in a company that interacts with its customers, to ensure their satisfaction with the company's products or services" (3:1). The best definition found in the literature is by Christopher H. Lovelock in "Developing and Managing the Customer-Service Function in

the Service Sector." He defines customer service as follows:

Customer service is a task,..., that involves interactions with customers in person, by telecommunications, or by mail. It is designed, performed and communicated with two goals in mind: operations efficiency and customer satisfaction (8:268).

This definition encompasses much more than the one by Blanding by including all tasks and personnel that are involved with customer satisfaction and operational efficiency. This is the definition this study will use in terms of Air Force civil engineering customer service. Once customer service has been defined in terms of a task, what are the functions of that task?

The functions of a customer service section in today's environment are as varied as the industries that employ a customer service function. From a standpoint of this study, the roles of customer service as provided by E. Patricia Birsner and Ronald D. Balsley in Practical Guide to Customer Service Management and Operations are the most relevant. Many of these roles, although presented in terms of the customer service function, apply to all personnel having contact with the customer. The authors define customer service in terms of ten different roles. These roles are as follows:

1. Communicator
2. Filter
3. Buffer or Shock Absorber
4. Educator
5. Problem Solver
6. Public relations

7. Coordinator
8. Monitor
9. Adjustor
10. Expediter  
(4:1-7)

Each of these roles requires some further explanation.

Customer service is primarily a communications function. In this context, what is meant is that customer service is the source of information about the organization. This role includes providing information on the processes of the organization as well as how to obtain service from the organization and the procedures involved.

The filter and buffer roles are related functions of customer service. In the filter role, customer service screens the information coming into the organization, passing only that which the organization needs. In the buffer role, customer service acts as the screen between customers with problems and complaints and the production process of the organization.

Customer service also functions as an educator. In this role, it performs three functions. First, it promotes satisfaction with an organization's products or services. Secondly, it helps the customer make the right initial decision and, finally, it attempts to increase the customer's awareness of the product or services being offered (15:122). This final function is similar to the communicator role.

The best known role of customer service is that of problem solver. In this role, customer service is the

customer's contact point within the organization for resolution of problems. This is the role with the greatest impact on customer satisfaction.

The public relations role is similar to the educator role. The function of this role is to serve the customer by presenting the best impression of the organization. Since customer service is the single point of contact with the organization, this role is crucial in that the impression the customer receives will influence that customer's perceptions of the service and consequently the customer's satisfaction.

The final four roles of monitor, adjustor, expediter and coordinator are all related to the function of interface between the customer and the organization. Customer service will coordinate with the production branches on a order, monitor that order as it flows through the system, expedite the order if necessary, and provide adjustment due to any problems the customer may have with the product or service.

#### The Nonprofit Organization

The discussion up to this point has been customer satisfaction and service with respect to the commercial sector and the motivational factor of profit. It is necessary, at this point, to examine the nonprofit sector and determine how the principles presented above relate to it.

Robert N. Anthony and David W. Young in Management Control in Nonprofit Organizations describe the differences in motivation between the profit-oriented and nonprofit organizations as follows:

A nonprofit organization is an organization whose goal is something other than earning a profit for its owner. Usually its goal is to provide a service... In the profit-oriented company, decisions made by management are intended to increase (or at least maintain) profits and success is measured, to a significant degree, by the amount of profits that these organizations earn... By contrast, in nonprofit organizations, decisions made by management are intended to result in providing the best possible service with the available resources; success is measured primarily by how much service the organizations provide and by how well these services are rendered. More basically, the success of a nonprofit organization should be measured by how much it contributes to the public well-being (2:35-36)

Anthony and Young further describe the nonprofit organization in terms of five different characteristics and how they relate to the profit-oriented company.

The first characteristic is the lack of a single criterion upon which to base management decisions. The profit-oriented company has profit as the single criterion upon which to judge the alternate courses of action. The nonprofit organization does not have the same single measure but, instead, has many different and sometimes conflicting objectives. These conflicting objectives are all competing for the same limited resources.

The second characteristic is the difficulty of relating costs and benefits. This makes the allocation of the limited resources to the various objectives difficult to

decide since there is no measure of the benefit of allocating money to one objective versus another.

The third characteristic is the difficulty of measuring performance. In the profit-oriented environment, the measure of performance can be put in monetary terms such as cost of goods produced or profit earned. The nonprofit sector, providing mostly service, is much more difficult to measure because the quality or quantity of service cannot be readily quantified.

The fourth characteristic is the centralization of decision making. The often conflicting objectives of the non-profit organization require that important decisions be made at a higher management level than is possible at a profit-oriented organization. This high level of centralization and decision making tends to reduce the innovation and drive at the lower levels.

The final characteristic is that the nonprofit organization can compare performance only among like functions. There is no single criterion, like profit, against which to measure performance of different organizations (2:38-43). This last characteristic of comparison is the focus of TAC's PEER program.

The service a nonprofit organization provides is frequently directed from outside the organization. For example, base civil engineering's priorities are frequently directed by major command headquarters or the Air Staff. As a consequence, many of the goals and standards are set by

other than the organization's management. This prevents the same level of dedication to the objectives than if the goals had been established by the local management, as in the profit-oriented sector.

The Air Force is a nonprofit organization that exhibits all these characteristics. Air Force civil engineering is a service organization dedicated to providing the best service possible to its customers. According to McKnight and Parker in their study of organizational effectiveness, "Every civil engineering organization is a nonprofit organization whose primary mission is service" (14:4). No other organization affects as many people on the Air Force installation as civil engineering. For these reasons, it is important to understand how the principles of customer service and customer satisfaction can be applied to the nonprofit environment.

#### Customer Service within the Department of Defense

##### Department of Defense Programs

The major Department of Defense program involving customer service is the Excellent Installations program, managed by the Deputy Assistant Secretary of Defense (Installations), currently Mr. Robert A. Stone. The cornerstone of this program is the a set of "Principles of Excellent Installations" (21:30). The purpose of this program, according to Mr. Stone, is

to provide for our customers - the soldiers, sailors, marines, and airmen who defend America - excellent places to work and live, and excellent base services. (21:30)

The Excellent Installations program is divided into four principles intended to guide service organizations. The principles are "Serve our customers, Manage for excellence, Pay for excellence, and Foster the Excellent Installation approach." Each requires some discussion.

#### Serve the Customer

The customer is the primary reason for the service organization's existence, according to the Excellent Installations program. Guidelines include knowing the customers and their desires and expounding those desires to the congress, the commanders and the American people. Furthermore, In order to serve the customer, the service organization and the people that provide the service should show "unjustifiable overcommitment to improving facilities and services for our customers" (21:30). The basic principle of this guideline is that the customer is the most important aspect of Excellent Installations. The welfare of the customer should be of primary concern.

#### Manage for Excellence

The underlying principle here is that, within the defense community, people are the greatest asset. The guideline addresses several steps necessary to manage for excellence.

The first is allow people the freedom to "unleash their drive and entrepreneurial genius" (21:30). This means encouragement of new and innovative ideas and the freedom to try those new ideas in order to improve the service to the customer. In addition, the principles discourage conformity, uniformity and centralization because they prevents creativity and innovation.

The next step is to push responsibility and authority down as far as possible. This means to allow the decision to be made at the level that can best evaluate its impact and where it will have the greatest benefit.

The third step is promote competition. This means providing information on like units to inform organizations how well similar units are doing the same job. The best units should be acknowledged, recognized and rewarded. This is the basic premise behind Tactical Air Command's PEERs competition.

Finally, installation commanders should be allowed to take charge. This means that the commander should be provided relief from stifling regulation and allowed the authority to institute changes that will benefit the customer and the mission. This is the principle of the Model Installations program, another Department of Defense initiative.

### Pay for Excellence

The concept here is that excellence costs. The task has been defined as replacing every year at least "2 percent of our physical plant and do more repair and maintenance than the year before" (21:30). The concept of self-help, where the troops improve their own facilities, is also suggested. Self-help encourages pride and a feeling of ownership in the facility, and improved facilities are available much sooner. The foundation of this concept, however, is the realization by the commander and major commands that a real investment must be made in order to accomplish this.

### Foster the Excellent Installations Approach

The task here is to resist the tendency of large organizations to overregulate and centralize. Centralization and unity of effort were concepts that were popular during the 1970's. Today, many organizations are currently reversing that trend toward centralization. Tactical Air Command is the best example. The task is also to help and encourage any person or organization promoting the excellent installation approach.

Mr Robert Stone, speaking before the Air Force Institute of Technology Engineering Management Class 86S, stated that, the the Model Installations program (one part of the Excellent Installations program) was a huge success and the the program was scheduled for further testing on an expanded basis (20). The success of the Model Installation

program is one example of the application, within the Department of Defense, of the principles of customer service presented in the first part of this chapter.

#### Tactical Air Command

The principles of excellent installations and customer service are best represented by the dramatic turnaround of Tactical Air Command in the last decade. Tactical Air Command, prior to 1978, had measured its effectiveness in terms of the sortie rate, which had been falling for the last ten years. In 1978, General Bill Creech assumed command of Tactical Air Command. From the years 1978 through 1983, the Tactical Air Command sortie rate rose at a compounded annual rate of 11.2% (18:48,12:14)

This reversal of sortie rate decline was accomplished in spite of the reduction in funds and personnel that occurred during the same period. According to Tom Peters in A Passion for Excellence, General Creech stated " 'the Airplane is the customer for us, ' and he made heroes out of those whose mundane chores in fact most influenced his 'customers' productivity" (18:49). The turnaround at Tactical Air Command was due to a variety of reasons, all related to excellently managed organizations as defined by Peters. However, for the purpose of this study and its relationship to Tactical Air Command, the focus is on just two principles. The first is the principle of being close

to the customer. The second is the principle of competition among like units.

In Tactical Air Command, the ultimate customer is the aircraft, and its productivity is measured by the sortie rate. General Creech recognized the contribution that all organizations made to the customer, including the civil engineering units, which had the ability to affect the quality of life of the entire base. One of the programs instituted was the improvement of Tactical Air Command facilities under the premise that improved working conditions contributed to the pride and productivity of the work force and ultimately the main customer, the aircraft. The customer had become an extremely important part of civil engineering within TAC.

#### The PEERs Competition

In 1984, Engineering and Services at Headquarters Tactical Air Command instituted the civil engineering PEERs competition. The purpose of this competition was to improve productivity of the civil engineering units within Tactical Air Command and to provide improved service to the customers. The concept involved the establishment of a set of indicators for performance and measurement of each unit against standards established by the headquarters for each indicator. The performance of each unit was compared against all other units and the units were then rank ordered from the best to the worst for each indicator. The indicators

have been revised several time since the beginning of the program. The indicators provided in this report are current as of January 1986. Furthermore, these indicators are currently being evaluated for possible modification by HQTAC.

HQTAC/DEMG divides the PEERs competition into three major categories. Those categories are customer commitment, housing support, and mechanical systems maintenance. All three categories, to varying extents, measure support of the civil engineering customer.

#### Customer Commitment

The major category of customer commitment is primarily related to the Operations branch's performance in relationship to the main base and those customers. This measurement does not include military family housing. The category is divided into 4 indicators; Functional Emergency Response Rate; Maintenance Timeliness Rate; Scheduling Effectiveness Rate and Design Production Rate.

The Functional Emergency Response Rate is defined as "the number of emergency and urgent job orders completed on time divided by the number of emergency or urgent job orders completed during the month" (13:1). In this case completed "on time" means completed within the time period specified by AFR 85-1. The rationale for this indicator is that it measures the units' commitment to its customers and it

effectiveness in completing job orders. The Tactical Air Command goal or standard is 80%.

The Maintenance Timeliness Rate is defined as "Sum of the days to complete job orders, including supply time, for job orders completed during the month divided by the number of job orders completed during the month" (13:2). This indicator is further divided into two sub-categories of supply timeliness and backlog. The two sub-categories attempt to identify problems within this category. The rationale for this indicator is, again, to see how well the organization is meeting its commitment to the customer. The standard for this indicator is 75 days per job order.

The third indicator, within the Customer Commitment category, is Scheduling Effectiveness Rate. This is defined as "work orders completed that were programmed for completion divided by the number of work orders programmed for completion" (13:3). This indicator also measures the organization's customer commitment but this time on the completion rate of work orders versus job orders. Again, the Tactical Air Command standard is 80%.

The final indicator, in this category, is the Design Production Rate. This indicator is related to the design and engineering branch of the civil engineering organization. This is the only indicator that is measured by a sliding goal, defined quarterly. It is defined as "the value of projects above the design line 100% designed divided by the total value of yearly projected funding. The

goals for this indicator are 20% by 31 December, 67% by 30 March, 100% by 30 June, and 120% by 30 September.

#### Housing Support

The housing maintenance function is contracted on many CONUS Air Force installations. However, the response to customer desires must still be tracked. The two indicators, Housing Maintenance support and Housing Maintenance Timeliness, are defined in exactly the same terms as their customer commitment counterparts. The third indicator is Housing Occupancy Rate, which measures the effective use of housing assets. The fourth indicator is the Housing Commitment Dates Met, which measures the number of times the a house was available for the customer's move-in date. The final indicator is the Housing Turnaround Time, which measures the amount of time necessary to ready a house for occupancy (13:5-9). The first four indicators in this category are measure of customer service, while the fifth is a measure of the organization's effectiveness.

This study does not address the Military Family Housing responsibility of the civil engineering organization in its discussion of customer service. The housing portion of the PEERs program is provided as background information on the PEERs program only.

### Mechanical Systems Maintenance

The Mechanical Systems Maintenance category measures how well the civil engineering unit is maintaining environmental systems on the base. The category is broken down into three sub-categories of break rate, hard break rate, and fix rate. The break rate is the rate at which a building's environmental systems break down, while the fix rate is the rate at which down systems are repaired. The hard break rate is similar to the break rate except that hard break is defined as a system down for longer than 2 days, whereas break rate is any breakdown of a mechanical system. The three sub-categories are further divided into two indicators of heating and cooling equipment. (13:10-12)

The degrading of mechanical systems is believed to be one of the major reasons for customer dissatisfaction with civil engineering. However, this indicator is internal to the civil engineering organization and measures civil engineering's idea of what is important in terms of customer satisfaction and service, and that, only indirectly.

The PEERs program is an attempt by Tactical Air Command to define goals of the engineering organization in relationship to its customers. This study attempted to determine if those goals are the proper ones in measuring customer service and satisfaction, from the customer's point of view, or if additional ones are needed.

## CHAPTER III

### METHODOLOGY

#### Overview

The purpose of this study was to determine the factors affecting customer service and satisfaction with TAC civil engineering. The objective was to identify criteria for inclusion into the TAC PEERs program. This chapter will describe the methods used to answer the basic research questions identified in Chapter I. The chapter includes a description of the survey instrument, the data collection plan, a discussion of the sample population and the reason for its selection, and an explanation of the statistical procedures used to evaluate the collected data.

#### The Survey

##### Justification

As mentioned in Chapter II, the civil engineering organization affects more people on an Air Force installation than any other organization. This study was designed to determine those criteria affecting customer satisfaction with TAC engineering units. The large number and diverse locations of the TAC bases (sixteen bases located in ten states) made personal interviews beyond the scope and time constraints of this study. Mailed surveys were selected as the primary method of data collection, due

to the ability to economically collect large amounts of data in a short period of time.

The mailed survey permits a large segment of the research population to be sampled economically, outweighing the problems of nonresponse and possible misintrepetation often associated with the mailed survey. An expected return rate of 60% was estimated to be sufficient for statistical purposes based on past experience with similar surveys. The survey structure is discussed in the next section.

#### Survey Instrument

The survey consisted of a five page questionnaire and a cover letter. The cover letter explained the purpose for the survey and how the results would be used. It also included an endorsement by Brigadier General Roy M. Goodwin, the Director of Engineering and Services at HQTAC, soliciting cooperation with the research effort. The cover letter also made clear that response to the survey was voluntary and would not affect the respondent's anonymity. The questionnaire was divided into seven parts.

The first part of the questionnaire consisted of seven questions designed to gather demographic data on the survey respondents. This data included rank, length of service, position, location, frequency of civil engineering contacts, and previous civil engineering experience. The demographic questions provided the groupings for the descriptive statistical analysis.

The second section requested information on selected criteria that were believed to affect customer satisfaction. The respondent was asked to rank each criterion on a scale of one to five, with one being the most important and five being the least important. Eighteen criteria, ranging from response time and work disruptions to workmen and customer service representative attitudes, were evaluated. This portion of the survey was designed to identify the most important criteria affecting the customer.

The third section evaluated the level of satisfaction with the service provided at each particular base. This part consisted of six questions that attempted to determine a respondent's level of customer satisfaction. The researcher realized that each base has its own unique requirements that impact upon customer satisfaction. Therefore, it was assumed that the experiences of the respondents with the local engineering unit would affect survey response. For this reason, the third section used the relationship with the local CE unit as a measure of customer satisfaction.

The fourth section requested the respondent to rank order ten criteria believed to have significant impact on customer satisfaction. The ranking was from one to ten with one being the most important factor affecting customer satisfaction. This section attempted to determine the relative importance of each factor in relationship to all others. It was believed that this section would provide the

greatest opportunity for misinterpretation by the respondent, but the relative importance of the criteria was necessary for the evaluation of the criteria for use with the PEERs program.

The fifth and sixth sections allowed the respondent to add and rank any additional factors considered important but not addressed by the questionnaire. Section V allowed the respondent to add additional criteria that the respondent felt affected customer satisfaction, while section VI requested the respondent to single out the single most important criteria, whether addressed directly or suggested by the respondent. Section VI also allowed the respondent to suggest ways of measuring the most important criteria. The purpose of these sections was to provide an opportunity to the respondent to freely offer suggestions and information on what determined their level of satisfaction and to identify any trends.

The seventh and final section of the questionnaire was the comments section. This section allowed the respondents to make any additional comments they felt could be of some aid to the study. The survey and cover letter are included in Appendix C.

#### Sample Population

The relevant population under study includes the entire base population, military and civilian personnel of both the host and tenant units. According to the Air Force

Magazine's "Guide to USAF Bases at Home and Abroad," this population, within the CONUS, totals some 104,668 people (1:162 -171). The problem was to determine a method of sampling a representative cross section of the base population. It should be noted that the civilian population, although included in the total population figures, was excluded from this study due to the time and approval constraints required to survey civilians. A stratified survey was used to provide a good cross section of the base population.

Eight TAC bases were randomly selected for surveying by assigning each base a number between 1 and 16. A basic random number computer program was used to generate eight numbers which cooresponded to numbers of the bases selected. The base listing and number as well as random numbers generated are provided in Appendix B. It was determined that 150 surveys at each base would provide a representative sample of TAC engineering customers. It should be noted at this point that Howard AFB, Panama was excluded from this study. Although a TAC Base, the unique problems associated with its location dictated its exclusion from the study.

The study examined two subgroups within the relevant population. The first group included the civil engineering building managers. The second consisted of senior officers in the rank of major and above. The two sample populations

were selected because they represented a cross section of the base population but were independent of each other.

All units occupying a facility on an Air Force installation are required to provide a building manager. They are selected by their unit commander and are responsible for the facility. The building managers are the interface between their units and civil engineering. They ranged in rank from airman first class to captain, with the majority in the ranks of staff sergeant to master sergeant. The building managers were selected as the target population because of their representativeness of the base population and their frequent contact with civil engineering. A sample of 100 managers at each base was selected from the building manager listings provided by the bases. Only five of the eight bases selected provided building manager listings, the other three either declined to participate or the listing was received too late to be included in the study. Base participation is listed in the Appendix B.

The second group in the sample was senior officers in the rank of major and above. This subgroup was selected due to the influence it exerts on civil engineering priorities. It is involved more with the strategic priorities of the engineering unit rather than the day-to-day operation. This group has the tendency to influence the senior commanders (i.e. Wing and Base Commanders) who determined civil engineering requirements. Fifty senior officers at each

base were randomly selected from the U.S. Air Force Atlas Data Base at the Military Personnel Center in San Antonio, Texas.

#### Data Collection Plan

The responses to the survey were numerically coded to facilitate data entry and statistical analysis. The base size code from the survey, for example, was coded as A=1, indicating a large base, or B=2, indicating a small base. The demographic information in section I was nominal data collected for the purpose of categorizing the data. According to Tull and Albaum, nominal data is "the lowest level of measurement...which consists simply of classifying objects events, individuals, etc., into categories" (22:84).

Section II used a rating scale to collect ordinal type data. Ordinal data is defined as having "the characteristics of the nominal scale plus an indicator of order" (11:88). Order in this case "implies a 'greater than' or 'less than statement' without stating how much greater or less" (11:88). Each criterion was rated on a five point scale from the most important to the least important. The variables identified in this section, such as attitude and professionalism, are those criteria assumed to affect customer service and satisfaction.

Section III collected interval level data using a five point Likert scale with assumed equality between intervals. Interval level data is defined as having the characteristics

of both nominal and ordinal data with one additional difference: "It incorporates the concept of equality of interval (the distance between 1 and 2 equals the distance between 2 and 3)"(11:91). The questions in this section defined the dependent variable of customer satisfaction.

Section IV collected ordinal level data with a ranking scale of 1 to 10. The section classified criteria by relative importance when compared to each other. Missing entries were coded with a blank and recoded in the statistical program as 99. The entries designated as 10 on the survey were input as 0 and recoded within the statistical program as a 10. This procedure was used to ease coding and conserve data fields.

Sections V and VI collected nominal data for the purpose of classifying additional criteria. The data collected was summarized into frequency tables based on the frequency mentioned.

#### Statistical Tests

Several statistical tests were used to analyze the collected data. The tests included descriptive statistics routines such as FREQUENCIES and CROSSTAB. Other tests included one-way analysis of variance (ANOVA) and the Scheffe comparison test in order to provide the statistical analysis necessary to answer the research questions.

The data was first tabulated and grouped using the CROSSTAB and FREQUENCIES subroutines of Statistical Package

for the Social Sciences (SPSSx) program. The descriptive statistic obtained are reported in Chapter IV. The grouping and tabulation were necessary to perform the additional statistical analysis.

The second procedure performed was the one-way analysis of variance (ANOVA). The ANOVA examines population variances to determine whether the population means are equal.

The procedure analyzes the variation of response and attempts to assign portions of this variance to a set of independent variables... The objective of the analysis is to locate important independent variables in a study and to determine how they interact and affect the response.(16:542)

In this case, the response or dependent variable is customer satisfaction with civil engineering service. It is compared to each criterion in section two.

The dependent variable was determined by combining the responses to the questions in section III. A Pearson correlation matrix was generated, using the Pearson statistic of the CROSSTABS routine, to validate this procedure. The Pearson coefficients ( $r$ ) determined the correlation of each question to the overall variable of customer satisfaction. A high correlation indicated that the question was a measure related to the dependent variable, customer satisfaction.

Several assumptions are made in order to apply the ANOVA procedure. The first is that the samples are independent and random. The second assumption is that the

sample populations have a normal distribution. Finally, it was assumed that the population variances are all equal.

The ANOVA tested the difference between the mean level of satisfaction for responses in each category. The null hypothesis, the hypothesis being tested, assumes that the mean response for each category is equal. Each criterion was examined to determine the level of importance each customer assigned to it. The mean level of satisfaction for those selecting each level of importance was compared to see if there were any differences. The null hypothesis stated that there was no difference. The alternate hypothesis, the hypothesis to be supported, stated that there was a significant difference in satisfaction between groups. A difference between each group's mean level of satisfaction would indicate a relationship between that criterion and the dependent variable. An alpha value (known as the level of significance) of 0.05 was selected for the decision criterion of whether to accept or reject the null hypothesis. A determination that a relationship existed between the dependent variable and criterion being considered was made by comparing the alpha value and the P-value. According to Devore:

The data is considered significant when the null hypothesis is rejected and not significant otherwise, so the definition can be paraphrased by saying that the P-value is the smallest level alpha at which the data is significant. (9:247)

The smaller the P-value, the greater the likelihood of rejecting the null hypothesis. The ANOVA program calculated

the P-value. If a P-value of less than 0.05 was calculated then the null hypothesis was rejected.

The ONEWAY ANOVA procedure of SPSSx was used to evaluate the criteria in Section II against the dependent variable of customer satisfaction. The results of this procedure are presented in Chapter IV.

The ANOVA procedure determines if a relationship exists between customer satisfaction and the various criterion such as attitude and professionalism, but it is unable to determine the significance between the independent variables. The Scheffe multiple comparison procedure determines whether the differences between the means are significant. It tests at a significance level of 0.05 and is considered conservative, thereby only identifying the strongest relationships between variables. The procedure used is part of the ONEWAY procedure of the SPSSx program.

## CHAPTER IV

### FINDINGS AND RESULTS

#### Introduction

This chapter presents the results of the research effort. The chapter begins with administrative facts and demographic information about survey responses. The data collected in sections II, III, and IV and the results of the statistical test are summarized in terms of the research questions and presented in tabular form. The chapter concludes with the outcome of the open ended questions in sections V, VI, and VII.

#### Response Characteristics

There were 892 surveys mailed, of which 20 were returned as undeliverable. A total of 568 completed surveys were returned for a overall response rate of 65.1%. The response rate for the two sub-populations were 62% for the senior officers in the rank of major and above and 66.1% for the building managers. Response rates were about evenly divided between the large and small bases in the survey. A large base was defined as a base with a total population exceeding 5500 personnel, while a small base had less than 5500. Tables 1 and 2 show the distribution of respondents by base and rank respectively.

Table 1  
RESPONSE BY BASE

<u>BASE</u>	<u>NUMBER</u>	<u>PERCENT</u>
Nellis AFB *	28	4.9
Tyndall AFB *	33	5.8
Moody AFB	82	14.4
Myrtle Beach AFB *	36	6.3
MacDill AFB	88	15.5
George AFB	100	17.6
Luke AFB	110	19.0
Cannon AFB	<u>91</u>	<u>16.0</u>
TOTAL	568	100.0

\* - These bases did not provide a building manager listing, only senior officers were surveyed at these bases.

Table 2  
RESPONSE BY RANK

<u>RANK</u>	<u>NUMBER</u>	<u>PERCENT</u>
COL	49	8.6
LT COL	117	20.6
MAJ	77	13.6
CAPT	12	2.1
LT	13	2.3
MSGT to CMSGT	119	21.0
SGT to TSGT	178	31.3
<u>AMN to ALC</u>	<u>3</u>	<u>.5</u>
TOTAL	568	100.0

The demographic data collected included several other characteristics that are presented here. There were 82% of all respondents with over 10 years of service, with 22.9% exceeding 20 years. This indicates a high level of Air Force experience among the respondents. Of the respondents, 61.4% had dealt with civil engineering 10 or more times in the past year, with 44.5% of those responding having more the 20 contacts. The sample population has extensive experience in dealing with the civil engineering organization, thereby validating its use as a representative sample of the engineering customer.

There was very little indication of experience with the internal workings of civil engineering, with less than 7.4% of the respondents having ever been assigned to a civil engineering unit. This appeared to indicate little knowledge of civil engineering policy and procedures.

## Results

### Frequency Analysis

The objective of this study was to identify criteria from the customer's point of view that determined customer service and satisfaction and to determine how to measure those criteria. Section II of the survey requested that the respondent rate the criteria provided on a scale of one to five with one being most important and five being the least. Table 3 provides the overall tabulated response to the eighteen different criterion thought to be related to

Table 3

## Overall Response to Criteria Importance

<u>Criterion</u>	most important -----> least important					<u>mean</u>	<u>rank</u>
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>		
8. Response to non-emergency work requests.	95	203	212	43	15	2.44	15
9. Customer service representative's attitude.	162	242	138	18	17	1.99	7
10. Estimated completion date provided upon submission of work request.	206	263	73	16	10	1.88	6
11. Professionalism of the civil engineering workforce.	245	221	89	12	1	1.77	3
12. Notification of work start	160	205	140	44	19	2.22	11
13. Disruption to the customer's work area.	155	200	154	47	12	2.05	8
14. Cleanup upon work completion.	229	241	82	13	3	1.80	4
15. Assistance provided by customer service	120	226	171	40	11	2.29	14
16. Explanation of work upon completion.	145	200	165	43	15	2.27	13
17. Once work is started it is completed in a timely manner.	284	228	40	11	5	1.64	1
18. Keeping work area free of clutter	122	220	176	37	13	2.10	9
19. CE follow up to ensure proper completion.	165	213	138	40	12	2.16	10
20. Worker's appearance.	53	140	234	97	44	2.89	17

Table 3 (Continue)  
Overall Response to Criteria Importance

<u>Criterion</u>	<div style="display: flex; justify-content: space-between; align-items: center;"> <span>most important</span> <span>-----&gt;</span> <span>least important</span> </div>					<u>mean</u>	<u>rank</u>
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>		
21. Information of CE unit and its procedures. (Public Relations)	26	68	204	157	113	3.26	18
22. Information on work request submission procedures.	49	144	238	101	36	2.87	16
23. Prompt, accurate, answers to work request status.	228	246	73	15	6	1.81	5
24. Periodic listings of work requests and their status.	163	196	137	47	25	2.25	12
25. Notification to the customer of work delay.	272	216	59	12	9	1.71	2

customer satisfaction and service. The table is divided into five groups corresponding to the five levels of importance. The number of respondents selecting each group and the overall mean response to the criterion is presented. Each criterion was then ranked based upon its mean value for comparison purposes. Tables 4 and 5 break the response down into the two subgroups of senior officers and building managers. The mean response for each criterion was then calculated for each subgroup and ranked. A comparison of the mean results for the top five criteria for each subgroup is presented in Table 6. Except for some minor variations, the relative rank of each criterion within the subgroups and compared to the overall results appears to remain the same.

Table 7 summarizes the data in section IV that requested the respondent to rank order the characteristics from one to ten. This portion of the survey caused some confusion among the respondents and yielded only 443 usable surveys. The results are based on this number. The results are the tabulation of points gathered by assigning 10 points every time a characteristic was chosen as number 1 or most important, 9 points for number 2 etc. The characteristics were then ranked according to the total points accumulated.

The criteria in section II was then compared to the variable of customer satisfaction computed from the responses to section III of the survey. The items in section III measured the level of satisfaction the customer had with the local civil engineering organization.

Table 4

## Senior Officer Response to Criteria Importance

<u>Criterion</u>	most important -----> least important					<u>mean</u>	<u>rank</u>
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>		
8. Response to non-emergency work requests.	39	102	83	17	2	2.35	10
9. Customer service representative's attitude.	40	119	68	10	6	2.27	8
10. Estimated completion date provided upon submission of work request.	65	142	28	6	2	1.92	4
11. Professionalism of the civil engineering workforce.	83	107	44	8	1	1.92	3
12. Notification of work start	53	95	66	22	7	2.32	9
13. Disruption to the customer's work area.	53	85	72	27	6	2.79	14
14. Cleanup upon work completion.	73	112	50	6	2	1.98	6
15. Assistance provided by customer service	29	102	85	21	6	2.48	13
16. Explanation of work upon completion.	32	89	88	25	9	2.54	15
17. Once work is started it is completed in a timely manner.	127	95	15	4	2	1.60	1
18. Keeping work area free of clutter	33	91	94	21	4	2.47	11
19. CE follow up to ensure proper completion.	53	111	57	20	2	2.21	7
20. Worker's appearance.	5	45	118	53	22	3.17	16

Table 4 (Continue)

## Senior Officer Response to Criteria Importance

<u>Criterion</u>	most important -----> least important					<u>mean</u>	<u>rank</u>
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>		
21. Information on CE unit and and its procedures (Public Relations)	3	13	79	81	67	3.81	18
22. Information on work request submission procedures.	6	44	111	58	24	3.20	17
23. Prompt, accurate, answers to work request status.	67	136	31	6	3	1.94	5
24. Periodic listing of work requests and their status.	39	97	73	22	12	2.47	11
25. Notification to the customer of work delay.	84	125	28	3	3	1.83	2

Table 5

## Building Manager's Response to Criteria Importance

<u>Criterion</u>	most important -----> least important					<u>mean</u>	<u>rank</u>
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>		
8. Response to non-emergency work requests.	56	101	129	26	13	2.50	15
9. Customer service representative's attitude.	123	123	70	8	1	1.90	7
10. Estimated completion date provided upon submission of work request.	141	121	45	10	8	1.84	6
11. Professionalism of the civil engineering workforce.	162	114	45	4	0	1.66	2
12. Notification of work start	107	110	74	22	12	2.14	12
13. Disruption to the customer's work area.	102	115	82	20	6	1.99	8
14. Cleanup upon work completion.	156	129	32	7	1	1.67	4
15. Assistance provided by customer service	91	124	86	19	5	2.15	13
16. Explanation of work upon completion.	113	111	77	18	6	2.06	9
17. Once work is started it is completed in a timely manner.	157	133	25	7	3	1.66	3
18. Keeping work area free of clutter	89	129	82	16	9	2.16	14
19. CE follow up to ensure proper completion.	112	102	81	20	10	2.12	11
20. Worker's appearance.	48	95	116	44	22	2.68	17

Table 5 (Continue)

## Building Manager's Response to Criteria Importance

<u>Criterion</u>	<div> <div>most</div> <div>important</div> </div> <div>-----&gt;</div> <div> <div>least</div> <div>important</div> </div>					<u>mean</u>	<u>rank</u>
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>		
21. Information of CE unit and its procedures (Public Relations)	23	55	125	76	46	3.21	18
22. Information on work request submission procedures.	43	100	127	43	12	2.63	16
23. Prompt, accurate, answers to work request status.	161	110	42	9	3	1.72	5
24. Periodic listing of work requests and their status.	124	99	64	25	13	2.09	10
25. Notification to the customer of work delay.	188	91	31	9	6	1.62	1

Table 6

Top Five Criterion According to Importance

<u>Rank</u>	<u>Building Manager</u>	<u>Mean</u>	<u>Senior Officers</u>	<u>Mean</u>
1	Notification of Delay	1.62	Completion of work in a timely manner	1.60
2	Professionalism of the CE Workforce	1.66	Notification of delay	1.83
3	Completion of work in a timely manner	1.66	Professionalism of CE workforce	1.92
4	Clean up upon work completion	1.67	Estimate of work completion	1.92
5	Prompt, accurate information on work status	1.72	Prompt, accurate information on work status	1.94

Table 7

## Ranking of Customer Service Characteristics

<u>Characteristics</u>	<u>Senior Officers</u>	<u>Building Managers</u>	<u>Total</u>	<u>Rank</u>
38. Timeliness of Response	2007	1983	3990	1
33. Competence of workforce	1901	1766	3667	2
36. Helpfulness of customer service representative	1238*	1383	2621	3
40. Follow up of work	1345*	1266*	2611	4
34. Explanation of work prior to start	1214	1308*	2522	5
41. Ease of submitting work requests	1177	1275	2452	6
37. Explanation of work upon completion	989	1106	2095	7
35. Friendliness of customer service representative	834	1080	1914	8
32. Appearance of workforce	592	723	1315	9
39. <u>Public relations</u>	<u>527</u>	<u>665</u>	<u>1192</u>	<u>10</u>
Total Respondents	215	228	443	

(\*) denotes characteristics were reversed in  
the subgroup's ranking

Table 8 provides Pearson correlation coefficients for the data from Part 3. The Pearson coefficients measure the correlation of each factor with the combined variable of satisfaction. Questions that were designed to elicit a negative response were recoded to indicate a positive correlation so that all data was evaluated the same way. Correlation is indicated by the r value, which is scaled from -1.0 to +1.0 with the sign an indication of direction only. The higher the absolute value of the r value, the stronger the correlation. The closer the r value to zero, the weaker the correlation.

Table 8  
Customer Satisfaction Correlation

Measure	Satisfaction correlation (r)
1. Difficulty of work request paperwork.	.4766
2. Need for CE callback to reaccomplish work	.5808
3. Ease of contacting CE by phone	.6935
4. Perception of positive attitude of customer service representative.	.6471
5. Perception of CE's concern for paperwork	.7251
6. Perception of CE workforce attitude	.6423

### Analysis of Variance (Anova) Results

The ONEWAY ANOVA program of the SPSSx package was used to compare the criteria of section II to the dependent variable of customer satisfaction. The ANOVA compared the mean level of satisfaction against each response group for each criterion. For example, the mean level of satisfaction of that portion of the sample population that selected response time as most important (i.e. group 1) was compared to the mean level satisfaction of the other parts of the population that had selected other importance levels for the same criteria. The calculated P value was compared to the established alpha value of .05. Criteria with a P value less than the .05 value were considered significant and the null hypothesis of equal means rejected. Criteria with a P value exceeding the .05 value were not considered significant; therefore, the null hypothesis was not rejected. The analysis and significance of acceptance or rejection of the null hypothesis is included in chapter V. Table 9 lists the criteria and corresponding P values that were found not to be significant. Table 10 lists the seven criteria found to be significant, allowing rejection of the null hypothesis. Tables 11.1 to 11.7 provide the number of respondents selecting each group and their mean level of satisfaction for each related criterion that was considered significant.

Table 9

Criteria Found NOT to be Significant

<u>Criterion</u>	<u>P Value</u>
8. Response to nonemergency work requests.	.5879
10. Estimated completion date provided upon submission of work request.	.2302
12. Notification of work start.	.1946
13. Disruption to customer's work area.	.2760
15. Assistance provided by customer service.	.2939
16. Completion of work in a timely manner.	.2516
19. CE follow up to ensure proper completion.	.1728
22. Information on work request submission procedures.	.2132
23. Prompt, accurate answers to work request status.	.1041
24. Periodic listing of work requests and their status.	.3528
25. Notification of the customer of work delay.	.1612

Table 10

## Criteria Found to Be Significant

	<u>Criteria</u>	<u>P Value</u>
9.	Customer service representative attitude.	.0006
11.	Professionalism of civil engineering workforce.	.0003
14.	Cleanup upon work completion.	.0189
16.	Explanation of work upon completion.	.0102
18.	Keeping work area free of clutter.	.0341
20.	Worker's appearance.	.0108
21.	Information on CE unit and its procedures (Public Relations).	.0039

Table 11.1

## Customer Service Representative Attitude

<u>Importance</u>		<u>Number of Respondents</u>	<u>Group Mean Level of Satisfaction</u>
most	1	163	14.7791 *
	2	242	16.0744
	3	138	16.4855 *
	4	18	17.5556
least	<u>5</u>	<u>7</u>	<u>18.8571</u>
TOTAL		568	15.8838

(\*) Denotes significant difference in the mean level of satisfaction between these groups.

Table 11.2

## Professionalism of Civil Engineering Workers

<u>Importance</u>		<u>Number of Respondents</u>	<u>Group Mean Level of Satisfaction</u>
most	1	245	15.0857 *
	2	221	16.0905
	3	89	17.1910 *
	4	12	18.5000
least	<u>5</u>	<u>1</u>	<u>18.0000</u>
TOTAL		568	15.8838

(\*) Denotes significant difference in the mean level of satisfaction between these groups.

Table 11.3

## Cleanup Upon Work Completion

<u>Importance</u>		<u>Number of Respondents</u>	<u>Group Mean Level of Satisfaction</u>
most	1	229	15.2707
	2	241	16.3651
	3	82	15.7561
	4	13	17.7692
least	<u>5</u>	<u>3</u>	<u>19.3333</u>
TOTAL		568	15.8838

Table 11.4

## Explanation of Work Upon Completion

<u>Importance</u>		<u>Number of Respondents</u>	<u>Group Mean Level of Satisfaction</u>
most	1	145	14.9931
	2	200	16.2200
	3	165	15.8727
	4	43	16.4651
least	<u>5</u>	<u>15</u>	<u>18.4667</u>
TOTAL		568	15.8838

Table 11.5

## Keep Customer's Work Area Free of Clutter

<u>Importance</u>		<u>Number of Respondents</u>	<u>Group Mean Level of Satisfaction</u>
most	1	122	15.5246
	2	220	15.4455
	3	176	16.8378
	4	37	16.8378
least	<u>5</u>	<u>13</u>	<u>18.3077</u>
TOTAL		568	15.8838

Table 11.6

## Civil Engineering Workers Appearance

<u>Importance</u>		<u>Number of Respondents</u>	<u>Group Mean Level of Satisfaction</u>
most	1	53	14.4717 *
	2	140	15.4214
	3	234	16.2179
	4	97	15.8763
least	<u>5</u>	<u>13</u>	<u>17.2955</u> *
TOTAL		568	15.8838

(\*) Denotes significant difference in the mean level of satisfaction between these groups.

Table 11.7

Information on CE Unit  
and Its Procedures (Public Relations)

<u>Importance</u>		<u>Number of Respondents</u>	<u>Group Mean Level of Satisfaction</u>
most	1	26	15.9615
	2	68	14.7500 *
	3	204	15.3676 #
	4	157	16.2675
least	<u>5</u>	<u>113</u>	<u>16.9469</u> * #
TOTAL		568	15.8838

(\*) Denotes significant difference in the mean level of satisfaction between these groups.

(#) Denotes significant difference in the mean level of satisfaction between these groups.

### Open Ended Questions

The second research question was to determine how to measure the criteria found to be related to service and customer satisfaction, for the purpose of including those criteria in the PEERs program. The survey instrument in sections V and VI requested the respondent to reply to several opened ended questions. Section V asked that the respondent add any additional criteria that were considered to impact on customer satisfaction and service. Section VI asked that the respondent pick the single most important criterion, including those suggested in section V, affecting service and customer satisfaction. Furthermore, section VI also requested the respondent to provide possible ways to measure those criteria. Sections V and VI were the areas of the survey that were most misunderstood or completely ignored by the respondents. Only 336 respondents replied to section VI of the survey and this figure drops to 109 answering section V. The respondents that did answer section VI did so by identifying a criterion but neglecting to suggest methods to measure the criterion.

Table 12 lists the additional criteria most frequently mentioned as affecting customer satisfaction. Table 13 identifies the most important criterion of those respondents answering section VI.

The responses to section VII, the comments section, are provided in Appendix A. A discussion of those comments is included in Chapter V.

Table 12

Top Ten Additional Criteria Impacting  
Customer Service and Satisfaction

<u>Criterion</u>	<u>Frequency Mentioned</u>
1. Quality of completed work.	24
2. Communications with the customer.	23
3. Monitor supply availability.	16
4. Provide periodic updates on outstanding work requests.	13
5. Evaluate customer service representatives.	12
6. Reduce coordination on work requests.	10
7. Monitor work completion rate (once started is it completed).	9
8. Workforce attitude.	7
9. Single contact point for work request status.	6
10. Self help assistance.	5

Table 13

## Single Most Important Criterion

<u>Criterion</u>	<u>Overall</u>	<u>Frequency Mentioned</u>		<u>Rank</u>
		<u>Seniors Officers</u>	<u>Building Managers</u>	
1. Response Time	138	76	62	1
2. Quality of Work	53	26	27	2
3. Work Completion in a Timely Manner	29	20	9	3
4. Professionalism & Competence	28	13	15	4
5. Customer Service Representative Attitude	28	9	19	5
6. Customer Communication	22	6	16	6
7. Accurate Estimate of Work Completion	14	7	7	7
8. Setting Work Request Priorities	4	2	2	-
9. Paperwork Tracking	4	1	3	-
10. Self Help Availability	4	3	1	-
11. Supply Availability	4	3	1	-
12. Work Order Follow-Up	2	1	1	-
13. CE Manning	1	-	1	-
14. Material Quality	1	-	1	-
15. Funding	1	-	1	-
16. <u>Base Engineer Leadership</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>-</u>
TOTAL	336	168	168	

## CHAPTER V

### ANALYSIS AND DISCUSSION

#### Introduction

This chapter contains the analysis of the results presented in chapter IV. The procedures and statistical tests described in chapter III identified the criteria perceived by the customer to be related to customer service and satisfaction. The analysis and discussion included in this chapter are presented in terms of answering the basic research questions of this study.

#### Research Question #1

The first research question asked what criteria, considered by the customer to be important, should be included into an evaluation program for customer satisfaction. The objective was to define indicators for customer service and satisfaction to be included into TAC's Civil Engineering PEERs competition. This question was addressed in two parts. The first objective was to determine what the customer considered important in terms of customer service. The second objective was to determine which factors affected the customer's satisfaction with that service.

### Customer Service

Sections II and IV of the survey gathered information on criteria the customer considered important. Section II identified the relative importance of eighteen different criteria on a scale of one to ten. Any criterion that had a mean importance level of 2.0 or less was considered an important factor in relation to customer service. The two population subgroups did not significantly differ (except for some minor variations) on the relative importance of specific criteria. The customer considered response to emergency requirements, communications with civil engineering, the quality of service and the attitude of those performing the service as the important criteria in customer service. The single most important factor, to the customer, was response time. Response time was ranked as number one criterion by 39% of all respondents. This was followed by the quality of work, the attitude and professionalism of those performing the service and communications with the engineering unit.

Response time, as used here, means response to work of an emergency nature. The relative importance of response to non-emergency work was of less concern to the customer having only a mean importance level of 2.44 and an overall ranking of 15. This importance of response time in relation to emergency requirements can be related to a basic need of the customer and once that need is satisfied then other factors take precedent.

The second factor considered important by the customer was the quality of service. The most frequent comment was to "do it right the first time." After response time, quality was most frequently mentioned as the number one criterion. It was the one criterion mentioned most often as an additional measure. Although quality was not directly addressed by the research, the customer's concern about it is evident in the importance levels of several criteria. The first is the concern about competence and professionalism of the CE workforce. This criterion received a mean rating of 1.77 and ranked second when compared against the other criteria. The concern for quality is further demonstrated by the customer's perceived need for CE follow-up to ensure proper work completion. This criterion was ranked fourth. The importance placed on restoring the facility to its original condition when work was completed was also related to the customer's concern about the quality of work. It received a mean rating of 1.80. It was evident from the data collected that the customer wants the job accomplished quickly and completely.

The customer had major concern about communications with the civil engineering unit. This meant being able to get prompt and accurate answers on the status of work requests from a single contact point within civil engineering. It received an overall mean importance level of 1.81 with both subgroups viewing this as a major concern.

The customer also expected communications to flow both ways. The provision of an accurate estimate of when the work could be expected to be accomplished and notification if a problem occurred with civil engineering's ability to meet its commitments were both important services to the customer. These two areas received overall mean importance levels of 1.88 and 1.71 respectively. Table 14 shows the ranking and the mean level of importance of the top criteria affecting customer service.

#### Customer Satisfaction

The second objective of research question #1 was to determine which criteria affected a customer's satisfaction. Satisfaction was determined by the responses to the questions of section III of the survey. The responses to each question in section III were compared to the computed overall variable of satisfaction to determine if a correlation existed. As expected, all six questions showed a high level of correlation. An Analysis of Variance (ANOVA) was used to compare the between groups mean level of satisfaction for each criterion. The results of the ANOVA yielded seven criterion at the 0.05 level in which the null hypothesis of equal mean levels of satisfaction could be rejected in favor of the alternate. The rejection of the null hypothesis indicated a relationship existed between the criterion and the dependent variable of customer satisfaction. No relationship could be defined for those

Table 14

## Ranking and Mean Level of Important Criteria

	<u>Criterion</u>	<u>Mean</u>	<u>Rank</u>
1.	Work completion in a timely manner	1.64	1
2.	Notification of work delays	1.71	2
3.	Professionalism of workforce	1.77	3
4.	Cleanup upon work completion	1.80	4
5.	Prompt, accurate estimates	1.81	5
6.	Estimated completion date provided	1.88	6
7.	Customer service representative's attitude	1.99	7

Table 15

## Criteria Related to Customer Satisfaction

	<u>Criterion</u>	<u>P value</u>
1.	Professionalism	.0003
2.	Customer service representative's attitude	.0006
3.	Public Relations	.0039
4.	Work explanation upon completion	.0102
5.	Workers appearance	.0108
6.	Cleanup of completed work area	.0189
7.	Work area kept free of clutter	.0341

criteria in which the null hypothesis could not be rejected. Those criteria related to customer satisfaction are listed in table 15.

The criteria with the strongest relationship to customer satisfaction were professionalism of the civil engineering workforce, customer service representative's attitude, and civil engineering public relations. It is noted that the three strongest relationships, identified by the ANOVA analysis, all affect a customer's perception of the civil engineering organization and the service it provides. Satisfaction may be defined as the difference between the expected level of service and the perceived level of service received. It would appear from the correlation that those criteria affecting perceptions, affect satisfaction.

#### Research Question #2

The second research question sought to quantify those criteria identified as important to customer service and influencing customer satisfaction. The purpose was to establish indicators that could be used to measure service to the customer and the level of customer satisfaction. The indicators could then be incorporated into the TAC PEERs program.

Section VI of the survey was designed to solicit suggestions for possible measurement methods from the survey respondents. However, most respondents identified

the important criteria but failed to suggest any measurement methods. Response time, being the criterion most often mentioned, was the easiest to measure. Response time would be simply measured by tracking the time between submission of the work request and completion of actual work. This is exactly what TAC currently does with its PEERs indicators for responsiveness.

The most common suggestion for measurement of criteria other than response time was establishment of a customer critique. The critique would allow customer feedback on such items as attitude, professionalism and perceived level of competence. The critique could use a simple Likert scale to measure a customers satisfaction to a series of questions. Although critiques existed in the past (ie. AF Form 1255), response rates were, historically, low. One way to increase participation would be to keep the form simple, asking only six or seven questions that could be answered in a couple of minutes. Another way to increase participation would be to require the craftsman to obtain the customer's signature upon completion of the work. The survey would be part of the completion form given to the customer and required to close out a job or work order. The implementation of the new WIMS systems would make the value of such a critique much more valuable by allowing quick input and tabulation of the data obtained from the surveys. Mean responses to each question and an overall mean satisfaction level could easily be compared to some

standard on a monthly basis. A critique of this type would be the easiest method of measuring customer satisfaction.

The critique could also be in the form of a telephone survey. Customers would be contacted on randomly selected basis based on completed job and work orders during the month. Again in the interest of time and money, the survey would be kept simple by addressing only six or seven questions. The critique would not only allow measurement of customer satisfaction but give the customer a forum in which to communicate wants and desires to the engineering unit.

Several methods were also suggested for the measurement of the quality criterion. The first was the customer critique already mentioned. Another method would be to track return calls, by facility, on the same or similar items. This rate would then be against an established standard. A third possible method would be to randomly select a percentage of completed job and work orders and have them inspected for completeness and quality of work. Standards would be established for acceptable levels of quality for each type of job. The results of the inspection would be compared against the standard.

Several respondents suggested the establishment of a CE hotline for customers complaints. The number of calls and type of complaints received could be tracked and compared to other units within the command to obtain a relative measure of customer satisfaction.

### Additional Comments

The additional comments received are included in Appendix A. Several of the items mentioned identified concerns of the customers not directly addressed by this study. One item does require special mention. The customer's perception of the civil engineering civilian workforce appears to have a negative impact on the civil engineering units within the command. The unfavorable perception of the civilian workforce could be a major contributor to the dissatisfaction of civil engineering service. The impact of that perception on customer satisfaction was not addressed in this study.

### Summary

The criteria considered to be important by the customer in relation to the service expected is not the same as the criteria that affects customer satisfaction. The customer's first concern is the response to emergency needs. Once that basic need has been satisfied, the important factors become quality of service, perception of workforce competence and professionalism, and attitude. These are important factors to the customer but they are not necessarily related to customer satisfaction.

Customer satisfaction is related to the factors that affect a customer's perceptions of the people and organization. Satisfaction is the difference between the expected service and the perception of the service received.

The criteria that affected a customer's satisfaction included the attitude and professionalism of the workforce and the public relations of the engineering organization. It is interesting to note that the most important criteria in the customer's mind , response time, was NOT related to customer satisfaction.

## CHAPTER VI

### CONCLUSIONS AND RECOMMENDATIONS

#### Introduction

The research results presented in preceding chapters have direct implications for TAC civil engineering. This chapter presents the conclusions drawn from those results and some recommendations for their implementation. The chapter concludes with recommendations for possible additional and follow on research.

#### Significance of the Results

The study indicated that the factors that were traditionally believed to impact on customer satisfaction were not related. Factors such as response time, customer communications and work quality were important when related to service but did not influence customer satisfaction. Customer satisfaction was instead linked to those criteria affecting the customer's perceptions of the service rather than the service itself. The attitude and professionalism of those providing the service and information about the civil engineering organization were factors related to customer satisfaction.

The civil engineering organization needs to re-evaluate the importance it places on certain factors. Those factors such as response time and quality still need to be addressed by the organization but additional criteria need to be

incorporated. For example, the customer service function must be manned and managed in such a way as to present a favorable impression of the engineering organization. The perceptions the customer walks away with after an encounter with this unit influence that customer's satisfaction to a large degree.

The way to increase a customer's satisfaction with the civil engineering organization, once the basic level of service is met, is to address those items affecting a customer's perceptions. These include such things as AFR 35-10 standards, civilian workforce appearance, work ethics, and the quality of the encounter between the customers and civil engineering personnel.

The communication link between the customer and the engineering organization needs to be opened. This can take the form of customer surveys and telephone interviews. Information about the organization needs to be disseminated to the base population on a frequent basis. The customer is a valuable source of information on what civil engineering is doing right as well as doing wrong.

#### Uses and Implication of Results

TAC's current PEERs program adequately covers the criterion of response time but fails to address the question of quality. The quality of civil engineering work should be evaluated on a command-wide basis. The establishment of a PEERs indicator for quality of work needs to be studied.

Customer satisfaction should also be included as a new PEERs indicator. A simple measurement tool, in the form of a customer critique, could be developed using a Likert scale to measure the level of customer satisfaction. The critique would be based on six or seven satisfaction questions that could be quickly and simply answered by the customer. Some basic changes in the way civil engineering does business would have to occur for this to be practical.

#### Recommendations for Further Research

The research presented in this report represents the response of a single command. Further research should be accomplished to determine if the results of this report are applicable to the Air Force as a whole. In addition the research neglected an integral part of the base population, the civilian. The addition of civilian data on customer satisfaction could have a marked impact on the results. Therefore, civilians should be included in the sample population of any further research.

Finally, a separate study should be conducted to further explain the relationship between customer satisfaction and the criteria identified by this study. The degree to which each criterion influences customer satisfaction would be of great interest.

Appendix A  
Respondent Comments

Listed below are all anonymous comments received from survey respondents. The comments have been edited for grammar and spelling only.

Major through Colonel

CE generally seems to be disassociated from the mission and as such lacks motivation/direction to complete required tasks timely and correctly. Doing the job cheaply rather than correctly appears to be the motus operendi.

\* \* \*

Here at Myrtle Beach they have helped me time and again to get the job done. They're super!

\* \* \*

The time it takes to get a job done. CE seems to be perpetually undermanned to the point that it takes forever to get things done. Civilians are technically competent, but you can't work them over time and it's hard to get 8 hours work out of them on some days. And contractors are worse.

Most Civil Engineers are harassed by Wing Commanders who are in a constant panic trying to upgrade the golf course before the 3-star or 4-star arrives. That's probably why ordinary customers wait and wait and wait and wait!

Good luck, but I doubt if you can fix it !

\* \* \*

Good inspection prior to new tenants and if needed urgently should be kept in schedules for early repairs. Compared to overseas this place is too poorly maintained.

\* \* \*

TAC/DE staff are tops. 27TFW/DE is involved and responsive.

\* \* \*

Appearance of workforce does not differentiate between enlisted and civilian workers. Enlisted need to meet 35-10 and civilians should be neat.

\* \* \*

I often sense that self help is more often the norm rather than the exception.

\* \* \*

We need to reduce the long time log it takes for CE to "PLAN" simple jobs and gather appropriate materials. For example, planning for self help 332 to put in ground sprinklers should not take 90 days.

\* \* \*

Priortizing work requests (money) should always first consider people/mission and not individual whims and politics.

\* \* \*

Priority scheduling and changed priorities cause confusion. Limited self-help assistance leaves many projects only partially completed.

\* \* \*

CE here at Tyndall are most cooperative and supportive.

\* \* \*

We're blessed with a strong CE Commander whose honesty, sincerity, and can-do spirit permeates the whole squadron - that's the key to success - a STRONG LEADER!

\* \* \*

There should be a way for individual units to local purchase items for self-help.

\* \* \*

Timeliness of work and quality of work accomplished are the two most important factors in measuring CE. Cannon AFB presently has an outstanding CE squadron. Squadron Commander is tops.

\* \* \*

As a past CSS/CC and Squadron CC, Tyndall's CE is the best I have seen.

\* \* \*

The planning section has developed the ability to slow leak any project, large or small, into an art form. I am convinced that they could make time stand still.

\* \* \*

I can tolerate anything from CE if I believe their actions are dictated by a genuine concern for the mission/base. I cannot tolerate the attitude that the CE function and its procedures are more important than the mission, (...therefore CE is justified in "outwaiting" commanders because they will go away in two years while the BCE and especially its civilian bureaucracy will be there "forever"...) The BCE needs to be sensitive that commanders have a real need to complete projects in a timely manner if they are going to gain/keep the support of their subordinates. When projects drag on, enthusiasm and morale wane.

\* \* \*

CE at this base is severely undermanned and overtasked. We don't have enough people to maintain the base and airfield yet we're heavily tasked for Prime Beef!

\* \* \*

There is NO reason for a bad attitude at any time. I'm tired of being given an estimate that has no real world correlation. I don't care how, just get the work done right, the FIRST time. Shouldn't CE have a follow-up quality control?

\* \* \*

As a "service support" organization, they (CE as a group) spend too much time telling you how difficult it will be to "support" your requests/needs. They need the "Warrior Attitude" in doing their part of the overall mission of the Air Force!!

\* \* \*

A lot of wasted time and man-power in CE. Too many specialties. Too much "not my job" need to call another shop. If CE gets behind why don't they work additional hours to catch up? At Luke, they need one representative for the 58th, one for the 405th, etc. When you call with a problem, you always have to wait while someone tracks it down. We have had work orders in for almost TWO years with no action taken.

\* \* \*

Educate Wing Commanders and Vice Wing Commanders that minor construction is NOT the primary mission of the base CE Squadron.

\* \* \*

Immediate notification of changes to projects or unavailability of supplies on self-help or CE changes to orders.

\* \* \*

All factors considered, George AFB CE does a good job.

\* \* \*

Get workers to get out of "first gear". They go in slow motion, i.e. no sense of urgency.

\* \* \*

I just happen to have the best CE unit in the Air Force.

\* \* \*

Because the Medical facility works on a reimbursement basis, full-time personnel need to be assigned and supplies need to be available regardless of base funding. We have the people but not the supplies. It isn't right to have workers temporarily charged to MF8B and not have the materials to work with. Fortunately the problem has been minimized at George AFB because of the BCE involvement.

\* \* \*

As a tenant on the base, I find it very difficult to compete for my share of the TAC CE \$\$ because of downward directed and TAC/CC sponsored programs, I.E. LOOK. There should be a hook program for information systems organizations to focus the need for upgrading their facilities to TAC standards.

\* \* \*

At this base, civil engineering's heart is in the right place, they work hard and they do good work. Now, if I can just get pre-coordination done, everything will be gravy.

\* \* \*

CE has a language for work requests that must come from another universe. If you don't break the code your work will never be done. I've experience this at my last 4 assignments. CE try being more "user friendly."

\* \* \*

Educate the commanders and first sergeants on the DE organizational process and how things are done. All too often, we assume the worse, when understanding the system can take some pressure off the CE workforce.

\* \* \*

The system is the solution - change the way the system works and you'll improve how the system responds to the needs of the "customer"

\* \* \*

Evaluate the usefulness of each organization having a "mini-CE" for many problems.

\* \* \*

The CE organization here at Myrtle Beach AFB does a very good job.

\* \* \*

Luke does well for having so many "chiefs" to keep happy and the largest customer base to maintain.

\* \* \*

Too many retired on duty civilians in key positions. Difficult to work with them and apparently too hard to fire them!

\* \* \*

We need to fire some CE civilians who have been there forever and have no sense of urgency.

\* \* \*

Half the time when I call CE I get the feeling I work for them!

\* \* \*

CE at this base has been largely unresponsive to unit needs. This is due to the fact that civilians in CE management show no sense of urgency and show little regard for directions from the DE because they know they will be here a lot longer than the DE will. The #2 boss at DE is a civilian who is widely considered unresponsive. Send a HQ evaluator to George AFB to one-on-one interview various unit commanders and this will be confirmed. The DE is excellent and as responsive as he can be, but the folks who control day-to-day operations march to their own time not his.

\* \* \*

In my career the most frequent complaint has been an "inaccessability" to services, a composite of customer assistance, availability/timeliness. Resolution of this, where it exists, is the key to real service.

\* \* \*

Reliability of CE work - there seems to be no real "Crew chief". The bureaucracy and independent civilian workforce unnecessarily delays or impedes timely (efficient) completion of projects. Compare projected workloads against actual on-time completions. The internal control mechanisms are frequently cumbersome and prevent use of common sense to complete required work through mutual cooperation. CE needs help!

\* \* \*

I did the F-15 conversion on this base in 82-84. Construction was costly primarily because of change orders driven by hurried and haphazard planning/plans. None of this was the fault of civil engineering but rather a case of trying to do way too much with existing engineering resources. I suggest that future projects of this magnitude be accomplished by appropriate engineering/architectural support. With the money we spent on changes we could have hired an army of engineers.

\* \* \*

Demand professional competence in the CE staff from top to bottom and these surveys won't be necessary.

\* \* \*

As far as I'm concerned, the Nellis BCE is undermanned. Getting work out of them is like pulling teeth. The support received from the CEOS squadron is super! Conversely, work from the CESS squadron is marginal!

\* \* \*

Close supervision of family housing maintenance contractors is essential. Residents view them a "CE" just as much as the military and civilian personnel actually belonging to CE squadron.

\* \* \*

We need to invest more time and money into self help programs.

\* \* \*

Any project that does not get emphasis by a general officer is lost, slipped, poorly tracked, and seldom funded. Instead of logic we always use the squeaky wheel approach.

\* \* \*

Get more people in CE to get more work done!

\* \* \*

CE organizations are not manned enough to be able to satisfy work requirements in-house.

\* \* \*

Younger workers don't appear to have much appreciation for the importance of keeping the work area neat and not doing damage to surrounding work area.

\* \* \*

As a former base commander (4 1/2 years) it is my impression that all too often CE forgets to put people and the impact on base population, into their planning. They are too project/facility oriented and seem to forget that they are a service organization- there to serve PEOPLE-NOT THEMSELVES!

\* \* \*

I have found that when dealing with the civilians attached to CE, a general attitude is that they are going out of their way to do you a job and you are interfering with either their coffee breaks or lunch.

\* \* \*

Quality of workmanship lacks pride - slop it up and leave. Work requests enter planning limbo - never to be seen again or only seen when sent back for revalidation/ additional information. Overall assessment - a base civil engineer and a few caring individuals, surrounded by a bunch of unconcerned, inefficient incompetents.

\* \* \*

Moody has the best civil engineer in the Air Force, leading his squadron of professionals.

\* \* \*

While a single facility manager comes "out of our hide," he and his relationship with CE has paid valuable dividends for the entire base. Believe all large functions should have full time single point of contact for CE.

\* \* \*

What is non-emergency IAW higher headquarters and/or unit CE may not be in line with what my unit considers a non-emergency. Supposedly because of costs to completely repair, frequent CE repair efforts are patchwork and/or temporary which require frequent call backs.

\* \* \*

Tough to get CE help.

\* \* \*

We frequently have change orders and problems because there is no requirement to coordinate designs with the customer in TAC. We don't see O & M and MCP projects as the user after the single line drawing phase. SAC requires the user to sign off on all designs. TAC/DEH agreed to provide a checklist for services squadrons to use in reviewing dormitory/transient quarters designs nearly two years ago and it is not in the field yet. We continue to have doors that lock the wrong way, no lights in rooms, etc. which costs money.

\* \* \*

Worked closely with CE in having a building constructed. No "history of mistakes, problems, items to watch out for..." were available to review in helping to make project go smooth and having the best facility designed and constructed. At project completion, program review was not conducted to capture "lessons learned" to be passed on to next unit/individual facing same type of project.

\* \* \*

We get superior support here.

\* \* \*

Quality work is most important in MFH where the image of CE can suffer the most from lack of responsiveness and shoddy workmanship.

\* \* \*

With the exception of RED HORSE or PRIME BEEF team, the time lag between work order request and work start has always been considerable.

#### Lieutenants through Captain

Overall, I feel CE here at MacDill does an outstanding job under less than optimum conditions. Keep up the good work.

\* \* \*

The only problem I have had with CE has been timeliness of response. (This may be out of their control due to the workload.) Overall, CE has done an excellent job.

\* \* \*

Primary factor leading to customer dissatisfaction is too little money in CE budget holding up projects and too little manning to complete a large volume of work orders expeditiously.

\* \* \*

I feel the different sections of CE should talk to each other more. So many times one section doesn't know what another section is doing on the same project. A lot of times items are left undone because one section thought another was taking care of it.

#### Master through Chief Master Sergeant

The self help store is super!

AD-A174 116

MEASUREMENT OF CIVIL ENGINEERING CUSTOMER SATISFACTION

2/2

IN TACTICAL AIR CO (U) AIR FORCE INST OF TECH

WRIGHT-PATTERSON AFB OH SCHOOL OF SYST

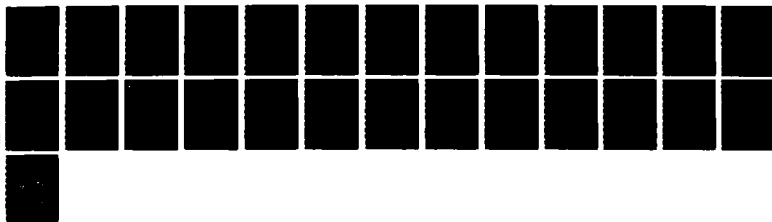
K R SINGEL

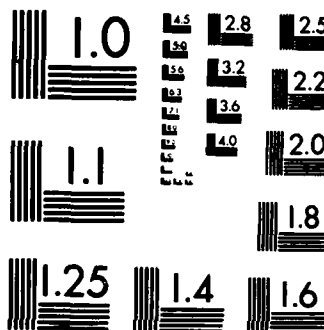
UNCLASSIFIED

SEP 86 AFIT/GEN/DEM/86S-23

F/G 5/1

NL





XEROCOPY RESOLUTION TEST CHART  
NATIONAL BUREAU OF STANDARDS-1963-A

\* \* \*

A worker will take off and be gone for hours, I don't know if they got hung up someplace, or if they are goofing off. It seems the military workers have a lot better attitude than civilians.

\* \* \*

...332s should have a place where the Pope signs!...

\* \* \*

The customer wants the job done. He/she does not understand: "...we don't have the people..." Shop areas need more help. Eliminate some paper work.

\* \* \*

Be sure that the person who works the call in desk is courteous and knowledgeable in CE systems.

\* \* \*

The priority that you receive for emergency type work such as air conditioners in summer and heaters in winter. The biggest problem is air conditioners. CE will drag their feet about fixing an air conditioner unit, especially for an enlisted member on a weekend or after duty hours. You end up having to call commanders and key personnel to get someone to respond and that shouldn't be the case. One of the questions they ask is do you have a medical problem. In the southeast when the temperature is around 90 degrees plus and humidity stays high and people have all types of allergies you shouldn't have to verify whether or not if you have a medical problem. If I were living off base I realize that I would have to pay good money to have a repairman come out and fix my unit, but that is what I would do. With this case in mind, if your dependent wife is faced with this type of situation she really gets a run around. And when a member is TDY or PCS he has enough on his mind to worry about, than having to wonder if CE is providing good customer relations.

\* \* \*

Quite often CE performs work requiring the services of more than one shop. Instead of CE referring the work to the appropriate sections, the unit or agency often has to initiate another work request to get the other shop to respond.

\* \* \*

Contractor vs. Civil Engineering. I have and still am experiencing problems getting work orders completed. CE states work on installed equipment under warranty is to be done by the contractor. Contractor has yet to come out for repairs.

\* \* \*

One of my biggest problems is not knowing when CE has completed the work. When I am out of the building or if the work to be done is outside I have no way to know of completion. CE used to give the building manager a form upon completion but it was discontinued a few years back. The form was a good method of letting me know when the job was completed. I'd like to see it return.

\* \* \*

Eliminate the widespread practice of having work orders listed as completed when in fact the work had never been accomplished. This creates a very negative, unprofessional outlook upon CE when we have never been contacted about such work, yet told it has been completed.

\* \* \*

Excessive re-opening of job order, excessive delay in starting AF Form 1135 request, poor maintenance performance by SMART team, delay in any job order because of parts on order, inexperience of workforce (i.e. 3 level performing work). I am dissatisfied with this CE squadron. Often when calling in a work order, the customer service section is RUDE. CE needs to standardize their workforce. Follow up must be made by supervisors. Customer service should be trained to realize that they perform a service not give the impression that they (CE) are doing a favor for the requesting unit. CE needs more funding immediately.

\* \* \*

Office personnel who cannot relate to building managers and custodians. Be realistic in rating performance and get rid of disgruntled dead wood.

\* \* \*

Better and timely assistance from CE would be appreciated during the course of doing a self-help project. More involvement on CE's part in this area would negate having to reaccomplish work.

\* \* \*

Straighten up CE here at Luke!!...it's lacking in many respects.

\* \* \*

Frequently, I have felt that the pervasive attitude of CE personnel is that they are doing me a favor, when they are only doing their job. As a supply person, we bend over backwards to assist our customers. Taking the "extra step" to ensure that the customer is satisfied is standard procedure in my squadron. I wish it were true in CE.

\* \* \*

CE is too much like a union, too many specialists. Most common response is often "not my job," and in addition, job dispatchers often send over the wrong "specialist." Our standard comments here at Luke is that "CE has the best union in the world!!"

\* \* \*

Information systems folks and CE need to work very close with each other on many or almost all 332s, O & M and MCP work effects communications. I have seen too many show stoppers due to Comm in the way or Comm not planned for, examples are endless. The regulations and frame work is already on paper; some are new, some are old and need improvement. One suggestion for 332s; all 332s should be coordinated with Comm personnel such as they are with the Fire dept. and Safety. I have seen too many O & M and self help jobs make Comm or CE jump due to poor planning/coordination on 332s.

\* \* \*

Everytime I submit a work request, CE either tells me that they don't have any money or that the work must be accomplished self help. I have my own job to do, I can't be doing CE's too!

\* \* \*

I have numerous work requests where the paperwork was completed but the actual job was not done. CE should try to improve follow up actions on jobs that they can't finish in one visit.

\* \* \*

It often appears that requests are "staffed" to death. If CE keeps it in plans or coordination long enough, the hope it it will be overcome by events. The user often seeks

0-6 or above intervention to get the job done. The program should be at E-5/6/7 level at best. CE has a big job to do. "We", the user, really do appreciate their efforts. However, it does appear to be a case of over or micro-management. Too many chiefs---needs indians....

\* \* \*

CE seldom meets the requirement date needed for work accomplishment. The requester has to constantly call CE and they'll get a different answer each time. Work order receipts and material due in listings will give an idea that things are being propped. Use of work order visuals would help show orders with critical dates and need attention. It's a no win situation! The squeakiest wheel gets the oil!

\* \* \*

Civil Engineers at Luke is short for CIVILIAN engineers. It appears to cause a lack of motivation to complete the day to day routine jobs in a timely manner. CE at Luke treats landscaping with contempt. If the carpenter shop wants to drive over your grass with their 1 1/2 ton truck so they don't have to carry their tools 100 yards they do so; leaving the building custodian to fill in the ruts in his lawn.

\* \* \*

The BCE section is the most efficient that I have ever had the pleasure of dealing with. Colonel O'Brien, the BCE Commander and his staff are to be highly commended.

\* \* \*

Remove "Civil and Civilians" from civil engineering. Military folks are more concerned with job satisfaction and accomplishment than they are job security.

\* \* \*

Work order numbers change too often and it is hard to find someone who knows when work will be started.

\* \* \*

Preparedness and flexibility. If the worker comes to fix a leaky faucet and finds a broken pipe the work order is put on hold until that pipe can be bought. I feel the worker should be more involved in how the job is completed and what materials should be brought to the job site. I've seen too many jobs put on hold because the worker found something else wrong while fixing what he came for. Most of us in the

public see only the obvious the CE worker is trained to see beyond our problem and is able to fix all the problems if he had the materials, tools, and time to do the job correctly.

\* \* \*

I think your office should look into some of the details that CE performs that might be passed onto other agencies on base. A good example is cutting grass. I believe these types of details can be accomplished by personnel that are assigned to the correctional facility instead of CE. This would then let CE personnel accomplish more important projects, I believe each organization should be more involved with the appearance of their area than CE.

\* \* \*

There is no sense of urgency when you deal with CE, perhaps because I do not understand their priority system. What is the "job satisfactory" rating for civil engineering personnel? Is this where the Air Force dumps those who cannot qualify for any other AFSC?

\* \* \*

CE has a poor attitude and does not provide enough information on job status/part status. Supervisor follow-up is needed on more jobs. In giving status information, CE uses terms common to CE but not to other base agencies.

\* \* \*

CE Commanders should take notice of the appearance (AFR 35-10) of their troops when they are performing work away from the CE squadron. Then, Commanders should take steps to ensure AFR 35-10 standards are adhered to.

\* \* \*

I've never had a job they couldn't do! Getting supplies in is usually their only set back.

\* \* \*

Have CE technicians inform the building manager of the status of a work order prior to leaving the job site. Provide estimate of repair time. Solve this by having follow ups of all open work orders.

\* \* \*

All commanders must be oriented in the operation of CE and not expect priority work for their organization only. This is a problem at multi-wing bases.

\* \* \*

I recently reviewed my building work orders and several work orders were not there and two from other buildings were filed in my folder. No control or cross-checking was available. I sincerely feel that a computerized system of work order tracking could be effectively implemented. The system could give the customer service personnel up-to-date status on every work order. It could provide for updating by any section within CE that was responsible for the work. Printouts could be obtained for each organization or building. Problems or overdue work could be easily monitored and corrected.

\* \* \*

CE seems to spend an awful lot of time "planning" and not very much "doing." What they "plan" is a "gold-plated" job only an outside contractor can do. Get the people in the CE shops more involved, let them do the work and you'll get "more done with less."

\* \* \*

Having people who manage the system caring about providing a service to the people and having common sense and using it when making some decisions.

\* \* \*

How about a qualification test/class for self-help customers who have personnel with similar CE background, obtained through civilian means, that will help lighten the load on CE with CE supervision/inspection of completed work. Goal: save time and money.

\* \* \*

The new "Smart Look" program has been a great help to the upkeep of facilities. The inspections have been able to spot and repair more in the last six months than I could get done all last year. Facility appearance and upkeep has never been better.

### Sergeant through Technical Sergeants

Get more money so CE can do their job.

\* \* \*

Sometimes the jobs are spread too thin, There seems to be only a few people that "can fix certain things" and without them, alot of times the job order cannot be completed all at one time.`

\* \* \*

The amount of paperwork is outrageous. Simplify. Let me call in problems, have the technician come look and decide what should be done about the problem. Let the technician do the paperwork. In most cases, the building custodians may not know the real problem. It may be a normal function that the custodian thinks is a problem. Teach (brief) custodians on normal building functions and problems.`

\* \* \*

Since the Civil Engineers have the largest budget on base, I feel that they should expand their services more. For the good of the base as a whole not just CE.

\* \* \*

The Cannon AFB CE squadron is exceptionally helpful and competent. If improvements to the CE squadron Air Force wide need to be made, studying their methods would be the place to start.

\* \* \*

Just as in any business - notification of time to report or complete the job, etc. is most important. Remember, everyone wants results ASAP - CE is heavily tasked. Everyone wants status of job requests and is often difficult to notify anyone of status if CE cannot supply information of this nature.

\* \* \*

Our civil engineers are proud and competent of their job. We are greatly satisfied with their work.

\* \* \*

I would like to be informed when work goes on stoppage for some reason, other than having to call and only find out the computer is down so nothing can be done. The Air Force is depending on computers too much - kill the power and work stops!

\* \* \*

CE has been very helpful at every base we've been to. There have been a few problems but 9 out of 10 times they were helpful, courteous, and competent. Too many people complain when don't understand.

\* \* \*

CE spends too much time working VIP/DV quarters and not enough time on dormitories! A lot of money is wasted on silly projects (like changing base signs to TAC brown) An awful lot of time is spent on duplication of efforts- do it right the first time. Also, AF Form 1135 should be in 4 copies- CE expects you to turn in the entire form, then they send the customer copy back with the job order. Often paperwork gets lost and building managers have no back-up documentation. How come CE manages to have what they need for their projects? Let the rest of us in on the secret!!

\* \* \*

Get rid of grass cutting contract on Cannon, this costs too much for what we can handle ourselves. Stop buying second and third rate materials. Spend a little more and get the better product. It will save everyone else the problems or it failing in the long haul. Since most of CE is vocational type trade work, place more emphasis on training in their day to day jobs instead of all wartime types of training.

\* \* \*

I have been well pleased with CE's response times and completions. Perhaps all base personnel are not as satisfied as I, but we, in this squadron, have had good turnaround times on most problems. P.S. I don't think an AF Form 332 should have to go through the base commander. The squadron commander's signature should be sufficient.

\* \* \*

Might be good to have local CE give out surveys too.

\* \* \*

In my opinion, I feel that the dormitories should be dealt a higher priority for there are at least 100 airmen living in these buildings and there are constant daily janitorial problems (i.e. clogged toilets, urinals, shower drains, etc.) and the response time in my opinion is too slow (usually 3 to 4 days).

\* \* \*

Next to Security Police, CE takes more grief than any other "general." AFSC. A shadow program might be a good idea, There is alot that goes on "inside" the CE squadron that most folks never even think about, or let alone know.

\* \* \*

It's interesting, certainly diversified, and maybe worth looking at. I was in a CE squadron at Offutt, though not in a civil engineering AFSC. Sure opened my eyes! Thanks.

\* \* \*

A work request was submitted to upgrade class C paneling to class A or B due to a fire inspection write-up. Due to lack of funds in CE, i.e. Gramm-Rudman, it was cancelled. How are we to distinguish between safety and where to cut budgets?

\* \* \*

High cost work orders should go contract. I feel minimum cost work could be completed by CE or local city or area business and would more than likely save the government money.

\* \* \*

CE has plenty of time and materials to maintain their buildings, but somehow seem to run short on other organizations. Strange isn't it?

\* \* \*

At Luke AFB I have never had any problem with CE or self help. They have a great group of personnel, the best I've seen to date.

\* \* \*

As a primary dorm manager of a building, I feel my office should have more on-hand availability of tools/equipment to fix "minor" repairs. The decision to call CE for more complex breakdowns would rest with me, thus cutting down greatly the time waiting for repairs.

\* \* \*

I feel CE is currently undermanned and does not have sufficient funds to provide the service everyone desires.

\* \* \*

Luke AFB CE will rank high on customer satisfaction. They show that they are prompt, helpful, and professional in all work accomplished for builder managers.

\* \* \*

I would really appreciate it if when we have self help projects that we could depend on CE for assistance whether through the use of equipment or tools.

\* \* \*

I feel to ease self-help requirements/request procedures would reduce the back log of routine work request for CE.

\* \* \*

I am very satisfied as a dorm manager. I cannot ask for better assistance. I feel I have the best.

\* \* \*

The single most important factor has been the changes in the funding procedures since Gramm-Rudman came into affect. This has created an irritant to most organizations and especially self-help.

\* \* \*

I get a pretty good response from the CE squadron here at George.

\* \* \*

CE on this base is more interested in satisfying the needs of General officers than the general population. Morale is poor because of it. Let's face it, CE is a dog job.

\* \* \*

The CE squadron is doing an excellent job, providing good and timely service to the entire base. One of the best operations I've seen.

\* \* \*

When work requests have been accomplished or closed out by CE personnel, the shop supervisor should verify completion with the requesting party before final close out.

\* \* \*

I also feel the CE should appoint a customer satisfaction representative to visit various squadrons periodically in the same manner that the hospital does. This would keep the civil engineers abreast of problems as they occur. The representative appointed should reply back to the building custodian with the answers to their problems.

\* \* \*

A friendlier attitude by CE customer service reps would be a breath of fresh air

\* \* \*

Once CE comes to work on a job, it's no problem then accomplishing it. The problem is getting them to come to work on your work order; sometimes I have forgotten about the whole thing and they later show up. A faster response time would be greatly appreciated by the occupants of the building(s).

\* \* \*

Often the BCE customer service representatives are overlooked for doing a good job. I feel that it would be helpful to determine if a quality service form should be present in the customer service function for customers to rate the quality of service supplied them.

\* \* \*

Building custodians must travel to several different organizations just for coordination prior to approval.'

\* \* \*

CE gets the job done in a proficient manner and with a smile.

\* \* \*

I feel the local CE has been extremely helpful in the many expedient work orders we have requested with exception of only a few.

\* \* \*

When they do a job they should do it right the first time instead of doing it enough to fix it but not really doing it completely.

\* \* \*

The actual work force is excellent, the problem lies with the civilians at customer service that forget what they are there for. If the civilian work force isn't willing to work with the military, they need to be replaced. I am tired of fighting with civilians to get work done in my building. The Air Force could save alot of money by firing civilians that aren't willing to do their job anyway.

\* \* \*

Cannon's CE people are about the quickest to respond to my requests of all the bases I've been stationed at. They do their jobs very well!

\* \* \*

On this base I have never received any listing of any type telling me the status of my work request.

\* \* \*

I believe when you work in the customer service you should display tact and courtesy even if you are having a bad day. If you treat people nice, they will often respond in kind.

Appendix B  
Base Selection

### Base Selection

The bases chosen for survey were selected based on a random number generator. The bases were numbered in the following order.

		Population	
		<u>Military</u>	<u>Civilian</u>
			Base Code
1.	Shaw AFB, S.C.	6,215	1,666 A
2.	Bergstrom AFB, Tx	5,199	960 A
3.	Langely AFB, Va	9,188	2,616 A
4.	<u>Nellis AFB, Nev</u>	13,500	1,500 A
5.	<u>Tyndall AFB, Fla</u>	4,464	1,517 A
6.	England AFB, La	3,057	667 B
7.	Moody AFB, Ga	3,369	500 B
8.	Homestead AFB, Fla	4,954	7,736 A
9.	<u>Myrtle Beach AFB, S.C.</u>	3,450	455 B
10.	Seymore Johnston AFB, N.C.	4,389	819 B
11.	<u>MacDill AFB, Fla</u>	7,000	1,915 A
12.	<u>George AFB, Calif</u>	5,424	484 B
13.	<u>Luke AFB, Ariz</u>	4,839	847 A
14.	<u>Cannon AFB, N.M.</u>	3,650	782 B
15.	Holloman AFB, N.M	6,634	1,402 A
16.	Davis-Monthan AFB, Ariz	5,124	1,359 A
17.	Mountain Home AFB, Id	3,906	506 B

The numbers generated were 4, 5, 7, 9, 11, 12, 13, 14. The bases corresponding to those numbers were selected for survey. Those bases selected are underlined.

Howard AFB, Panama was intentionally let out of the survey population due to it location outside the Continental U.S. with all the associated problems that occur with an overseas location.

Base size codes were assigned based on a cut off population of 5,500 personnel including both military and civilian.

Tyndall AFB, Nellis AFB and Myrtle Beach AFB, either did not provide building manager listings or the listing arrived to late to be included in the study. Senior officers only were surveyed at these bases.

Appendix C  
Survey Instrument



DEPARTMENT OF THE AIR FORCE  
AIR FORCE INSTITUTE OF TECHNOLOGY (AU)  
WRIGHT-PATTERSON AIR FORCE BASE, OH 45433-6583

1 JUL 1986

Dear Respondent:

Please take a few minutes out of your busy schedule to complete the attached survey. The survey is an attempt to evaluate the factors that affect customer satisfaction with the civil engineering organizations within Tactical Air Command. This is part of a thesis effort at the Air Force Institute of Technology. The product of this effort will be the development of a measurement tool to determine how the engineering organization is responding to customer needs. You are in a unique position to provide important information about what criteria affect satisfaction with the engineering service being provided.

Eight bases within Tactical Air Command have been selected based upon their relative sizes. Surveys are being sent to randomly selected building managers and senior supervisors on those bases, including you.

The attached questionnaire requests your evaluation of different criteria that may affect a customer's satisfaction with the service rendered. In addition, information is also requested on the current service being provided by your local base engineering unit.

Participation in this survey is entirely voluntary and your anonymity will be protected. I hope you will take the few minutes that it requires to complete this questionnaire. Your candid response is necessary if we are to accurately describe those factors affecting satisfaction with the engineering organization. I appreciate your cooperation in completing this survey and returning it within seven working days of receipt in the envelope provided.

Kenneth R. Singel, Capt, USAF  
AFIT Graduate Student

2 Atch

1. Research Questionnaire
2. Pre-Addressed Envelope

1st Ind, HQ TAC/DE (Brigadier General Goodwin)

We in Tactical Air Command are striving to improve the quality of life for our people. The results of this thesis effort will be especially useful in evaluating those factors affecting our customer's satisfaction with our service and suggest ways in which we may improve. Thank you for your assistance in completing the attached survey.

Roy M. Goodwin, Brigadier General, USAF  
DCS Engineering and Services

STRENGTH THROUGH KNOWLEDGE

Base Civil Engineering Customer Satisfaction Survey

These surveys were marked at the time of mailing with a base size code to indicate the size of the base. This code is for statistical purposes only and will not affect your anonymity.

Directions: Please mark your answers to questions 1-31 by circling the letter on the survey. If you decide to change any answers please erase the previous answer completely.

Section I: General information. Pick the answer that best describes your current position.

1. What is your rank?
  - a. Colonel
  - b. Lieutenant Colonel
  - c. Major
  - d. Captain
  - e. Lieutenant
2.
  - a. Master through Chief Master Sergeant
  - b. Sergeant through Technical Sergeant
  - c. Airman through Airman First Class
  - d. Other \_\_\_\_\_
3. How long have you been in the Air Force?
  - a. 0-3 years
  - b. 3-5 years
  - c. 5-10 years
  - d. 10-20 years
  - e. Over 20 years
4. What is your current position?
  - a. Commander
  - b. Branch chief
  - c. Supervisor
  - d. Building Manager
  - e. Other \_\_\_\_\_
5. Please indicate how often you have had contact with Civil Engineering in the last year.
  - a. 0-3 times
  - b. 4-10 times
  - c. 11- 20 times
  - d. more than 20 times

6. Have you ever been assigned to a Civil Engineering Squadron?  
a. Yes  
b. No

7. Please indicate on which base you are currently stationed.

- a. Nellis AFB, Nevada
- b. Tyndall AFB, Florida
- c. Moody AFB, Georgia
- d. Myrtle Beach AFB, South Carolina
- e. MacDill AFB, Florida
- f. George AFB, California
- g. Luke AFB, Arizona
- h. Cannon AFB, New Mexico

Section II: The following are activities that affect Civil Engineering customer satisfaction. Please circle the number that indicates how important each activity is to you. One (1) is most important; five (5) is least important.

	most important	----->	least important	
8. Speed of response to non-emergency work requests.	1	2	3	4 5
9. Courteous and friendly attitude of customer service representative.	1	2	3	4 5
10. When a request for work is submitted, a reasonable estimate of when work will be completed is provided.	1	2	3	4 5
11. Professionalism of Civil Engineering's workmen.	1	2	3	4 5
12. Prior notification of beginning of work.	1	2	3	4 5
13. While in my facility, trying to keep disruptions to a minimum.	1	2	3	4 5
14. Leaving facility clean and orderly upon completion of work.	1	2	3	4 5
15. Customer service representatives provide assistance and direction in filling out required paper work.	1	2	3	4 5
16. Upon completion of work, provide an explanation of the problem and what was done to solve it.	1	2	3	4 5

- |   | most<br>important | -----> | least<br>important |   |   |
|---|-------------------|--------|--------------------|---|---|
| 17. Once work is started, it is completed in a timely manner.                           | 1                 | 2      | 3                  | 4 | 5 |
| 18. Keeping work area clean and uncluttered while work is being accomplished.           | 1                 | 2      | 3                  | 4 | 5 |
| 19. Civil Engineering follow-up to be sure work was done satisfactorily.                | 1                 | 2      | 3                  | 4 | 5 |
| 20. Neat and clean appearance of workmen.   | 1                 | 2      | 3                  | 4 | 5 |
| 21. Provide more information on the Civil Engineering organization and how it operates. | 1                 | 2      | 3                  | 4 | 5 |
| 22. Provide more information on procedures for submitting requests for work.            | 1                 | 2      | 3                  | 4 | 5 |
| 23. Provide prompt, accurate answers to questions about work request status.            | 1                 | 2      | 3                  | 4 | 5 |
| 24. Provide periodic listings of all my work orders and their status.                   | 1                 | 2      | 3                  | 4 | 5 |
| 25. Provide notification when work is delayed and the reasons for the delay.            | 1                 | 2      | 3                  | 4 | 5 |

Section III: This section contains characteristics that could affect civil engineering customer service and satisfaction. Based on your experience with the civil engineering squadron on YOUR BASE, please indicate whether you agree or disagree, using the enclosed scale, with the following statements.

strongly agree	slightly agree	no opinion	slightly disagree	strongly disagree
+	+	+	+	+
1	2	3	4	5

- |   |   |   |   |   |   |
|---|---|---|---|---|---|
| 26. Work request forms are too complicated and difficult to fill out. | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|

strongly agree +	slightly agree +	no opinion +	slightly disagree +	strongly disagree +			
1	2	3	4	5			
27.	I never need to call Civil Engineering back to reaccomplish work.		1	2	3	4	5
28.	I can never get Civil Engineering on the phone.		1	2	3	4	5
29.	The Civil Engineering customer service representative is friendly and helpful.		1	2	3	4	5
30.	Civil Engineering appears to be more concerned with its paperwork than my problems.		1	2	3	4	5
31.	The Civil Engineering workforce has a postive, professional attitude.		1	2	3	4	5

Section IV: The following is a list of characteristics that may affect customer satisfaction. Please rank order the list with the most important having a ranking of 1 and the least important having a ranking of 10. Please indicate your answer directly on the survey.

- |     |   |       |
|-----|---|-------|
| 32. | appearance of workforce                         | _____ |
| 33. | competence of workforce                         | _____ |
| 34. | explanation of work prior to start              | _____ |
| 35. | friendliness of customer service representative | _____ |
| 36. | helpfulness of customer service representative  | _____ |
| 37. | explanation of work upon completion             | _____ |
| 38. | timeliness of response                          | _____ |
| 39. | public relations                                | _____ |
| 40. | follow ups of work                              | _____ |
| 41. | ease of submitting work request                 | _____ |

Section V: Please add any criteria you feel have an impact on customer service and satisfaction.

- A. \_\_\_\_\_
- B. \_\_\_\_\_
- C. \_\_\_\_\_
- D. \_\_\_\_\_
- E. \_\_\_\_\_

Section VI: Please indicate the single most important factor affecting your satisfaction with the service provided by civil engineering. Also indicate the method you feel would best measure this criteria.

---

---

---

---

---

Section VII: Please add any additional comments you feel may be of help to this study.

---

---

---

---

THANK YOU FOR YOUR COOPERATION.

## Bibliography

1. "Guide to USAF Bases," Air Force Magazine, 69 (5): 162- 170 (May 1986)
2. Anthony, Robert N. and Donald W. Young. Management Control in Nonprofit Organizations. Homewood, Illinois: Richard D. Irwin Inc., 1984
3. Bender, Paul S. Design and Operation of Customer Service Systems. New York: Amacon, 1976
4. Birsner, E. Patricia and Ronald D. Balsley. Practical Guide to Customer Service Management and Operations. New York: Amacom, 1982
5. Blanding, Warren. Practical Handbook of Distribution/ Customer Service. Washington DC: The Traffic Service Corporation, 1985
6. "Making Service a Potent Marketing Tool," Business Week: 164 - 170 (11 June 1984)
7. Clark, Terry. Lecture materials distributed in LOGM 631, Evaluating the Efficiency, Productivity and Performance of Air Force Organizations. School of Systems and Logistics, Air Force Institute of Technology (AU), Wright-Patterson AFB, Ohio, January 1986
8. Czepiel, John A. et al ed. The Service Encounter. Lexington Massachusetts: D.C. Heath and Company, 1985
9. Devore, Jay L. Probability and Statistics for Engineering and the Sciences. Monterey, California: Brooks/Cole Publishing Company, 1982
10. Ellis, George E. Major General United States Air Force, Director of Engineering and Services "A View from the Top." Address to AFIT students. Air Force Institute of Technology (AU), Wright-Patterson AFB, Ohio, January 1986
11. Emory, C. William. Business Research Methods (Third Edition). Homewood, Illinois: Richard D. Irwin INC., 1985
12. "How TAC increased Command-wide Productivity 80% from 1978 to 1984", Government Executive, 5 (17): 14 -18 (May 1985)
13. HQ TAC/DEMG , " PEERS Competition Indicators", Headquarters Tactical Air Command, Langley AFB, Virginia, (February 1986)

14. McKnight, Richard D. and Gregory P. Parker. Development of an Organizational Effectiveness Model for Base Level Civil Engineering Organizations. Unpublished master's thesis. LSSR 13-83, AFIT/LS, Wright-Patterson AFB, Ohio, September 1983
15. Meer, Claudia Gaillard. Customer Education. Chicago: Nelson Hall, 1984
16. Mendenhall, William and James E. Reinmuth. Statistics for Management and Economics (Fourth Edition). Boston: Duxbury Press, 1982
17. Miller William B. America's Management Challenge. Radnor, Pennsylvania: Chilton Book Company, 1983
18. Peters, Tom and Nancy Austin. A Passion for Excellence. New York: Random House, 1985
19. Peters Thomas J. and Robert H. Waterman. In Search of Excellence. New York: Warner Books, 1982
20. Stone, Robert A. Deputy Assistant Secretary of Defense (Installations), "Excellent Installations." A speech to AFIT Students. Air Force Institute of Technology (AU), Wright-Patterson AFB, Ohio, May 1986
21. Stone, Robert A. "Model Installations, Excellence in Action", The Military Engineer: 30-34 (January-February 1986)
22. Tull, Donald S. and Gerald S. Albaum. Survey Research, A Decisional Approach. New York: Intext Educational Publishers, 1973
23. US Department of the Air Force. Resources and Work Force Management. AFR 85-1. Washington DC: US Government Printing Office, 21 May 1982.
24. Wolff, Henry Bosley ed. Websters New World Dictionary. New York: G & C Merriam & Co., 1974

### Supplemental Material

1. Department of Defense. 1986 Annual Report of the Deputy Assistant Secretary of Defence (Installations). Washington DC: US Government Printing Office, May 16 1986
2. Lyon, Thomas L. "Characteristics of Excellently Managed Organizations-A Review of the McKinsey and Company Incorporated Findings", Armed Forces Comptroller 30 (2):26-28 (Spring 1985)
3. Norusis, Marija J. Introductory Statistical Guide, SPSSX. New York: McGraw-Hill Book Company, 1983
4. US Department of the Air Force. Operation and Maintenance of Real Property. AFR 85-10. Washington DC: US Government Printing Office, 14 October 1975

## VITA

Capt Kenneth R. Singel is a native of New York. He attended Syracuse University from which he graduated with a Bachelor of Science in Civil Engineering in 1974. He entered the USAF in December 1975 and received his commission through the OTS program. He served as a design engineering with the 49 Civil Engineering Squadron at Holloman AFB, New Mexico from April 1976 to October 1978 when he was reassigned to RAF Chicksands, England. He served as Chief of Program Development until his assignment to the National Security Agency, Fort George G. Meade, Maryland in November 1980. He entered the School of Systems and Logistics, Air Force Institute of Technology in June 1985.

Permanent Address: 158 Fremont St.

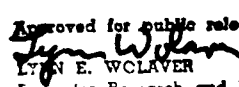
Harrison, New York 10528

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE

AD-A174116

## REPORT DOCUMENTATION PAGE

1a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED			1b. RESTRICTIVE MARKINGS		
2a. SECURITY CLASSIFICATION AUTHORITY			3. DISTRIBUTION/AVAILABILITY OF REPORT Approved for public release; distribution unlimited		
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE					
4. PERFORMING ORGANIZATION REPORT NUMBER(S) AFIT/GEM/DEM/86S-23			5. MONITORING ORGANIZATION REPORT NUMBER(S)		
6a. NAME OF PERFORMING ORGANIZATION School of Systems and Logistics		6b. OFFICE SYMBOL (If applicable) AFIT/LSG		7a. NAME OF MONITORING ORGANIZATION	
6c. ADDRESS (City, State and ZIP Code) Air Force Institute of Technology Wright-Patterson AFB, Ohio 45433			7b. ADDRESS (City, State and ZIP Code)		
8a. NAME OF FUNDING/SPONSORING ORGANIZATION		8b. OFFICE SYMBOL (If applicable)		9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER	
8c. ADDRESS (City, State and ZIP Code)			10. SOURCE OF FUNDING NOS.		
			PROGRAM ELEMENT NO.		TASK NO.
			PROJECT NO.		WORK UNIT NO.
11. TITLE (Include Security Classification) See Box 19					
12. PERSONAL AUTHOR(S) Kenneth R. Singel, B.S., Captain, USAF					
13a. TYPE OF REPORT MS Thesis		13b. TIME COVERED FROM _____ TO _____		14. DATE OF REPORT (Yr., Mo., Day) 1986 September	
				15. PAGE COUNT 122	
16. SUPPLEMENTARY NOTATION					
17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)		
FIELD	GROUP	SUB. GR.	Customers, Customer Service, Customer Satisfaction		
19. ABSTRACT (Continue on reverse if necessary and identify by block number)					
Title: MEASUREMENT OF CIVIL ENGINEERING CUSTOMER SATISFACTION IN TACTICAL AIR COMMAND: A PROTOTYPE EVALUATION PROGRAM					
Thesis Chairman: Gus Elliott, Captain, USAF Assistant Professor of Civil Engineering					
<div style="text-align: right;"> <p>Approved for public release LAW APR 190-17.                LYNN E. WCLAVER              Director for Research and Professional Development              Air Force Institute of Technology (AFIT)              Wright-Patterson AFB OH 45433</p> </div>					
20. DISTRIBUTION/AVAILABILITY OF ABSTRACT UNCLASSIFIED/UNLIMITED <input checked="" type="checkbox"/> SAME AS RPT. <input type="checkbox"/> DTIC USERS <input type="checkbox"/>			21. ABSTRACT SECURITY CLASSIFICATION UNCLASSIFIED		
22a. NAME OF RESPONSIBLE INDIVIDUAL Gus Elliott, Captain, USAF		22b. TELEPHONE NUMBER (Include Area Code) 513-255-4552		22c. OFFICE SYMBOL AFIT/DEM	

This thesis examines the effectiveness of Civil Engineering in Tactical Air Command (TAC) from the customer's point of view. The objective was to identify the criteria that had a significant impact on customer service and satisfaction. The purpose was to develop methods to evaluate and compare those criteria for inclusion into the TAC Civil Engineering PEERs competition.

A stratified survey was conducted of building managers and senior officers on eight TAC bases to identify customer needs and desires. The two groups were chosen to determine if significant variance existed for the criteria between the senior leadership and the everyday customer. Statistical procedures were used to determine the relative importance of the resulting criteria and the impact on customer satisfaction. Several possible methods for evaluating the most important criteria were suggested.

END

12-86

DTIC